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142

ELECTRIC RAILWAY JOURNAL

HOLDTITE
FRICTION TAPE
US
United States Rubber Company
Mechanical Goods Division
MADE IN U. S. A.

Friction Tapes
Holdtite
Utility
Gray Perfection

Splicing
Compounds
Relio
Usco

Tapes that Stick Tight and Insulate Permanently

United States Splicing Compounds and Friction Tapes have earned their reputation for endurance and permanent insulating value by years of satisfactory service under all conditions.

The complete United States line includes:

"A Tape for Every Trade and Service"

Our branches are located in every industrial center, insuring an adequate and prompt delivery service.

United States Rubber Company

1790 Broadway New York City

The World's Largest and Most Experienced Manufacturer of Mechanical Rubber Goods

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US
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AND ASSOCIATED COMPANIES

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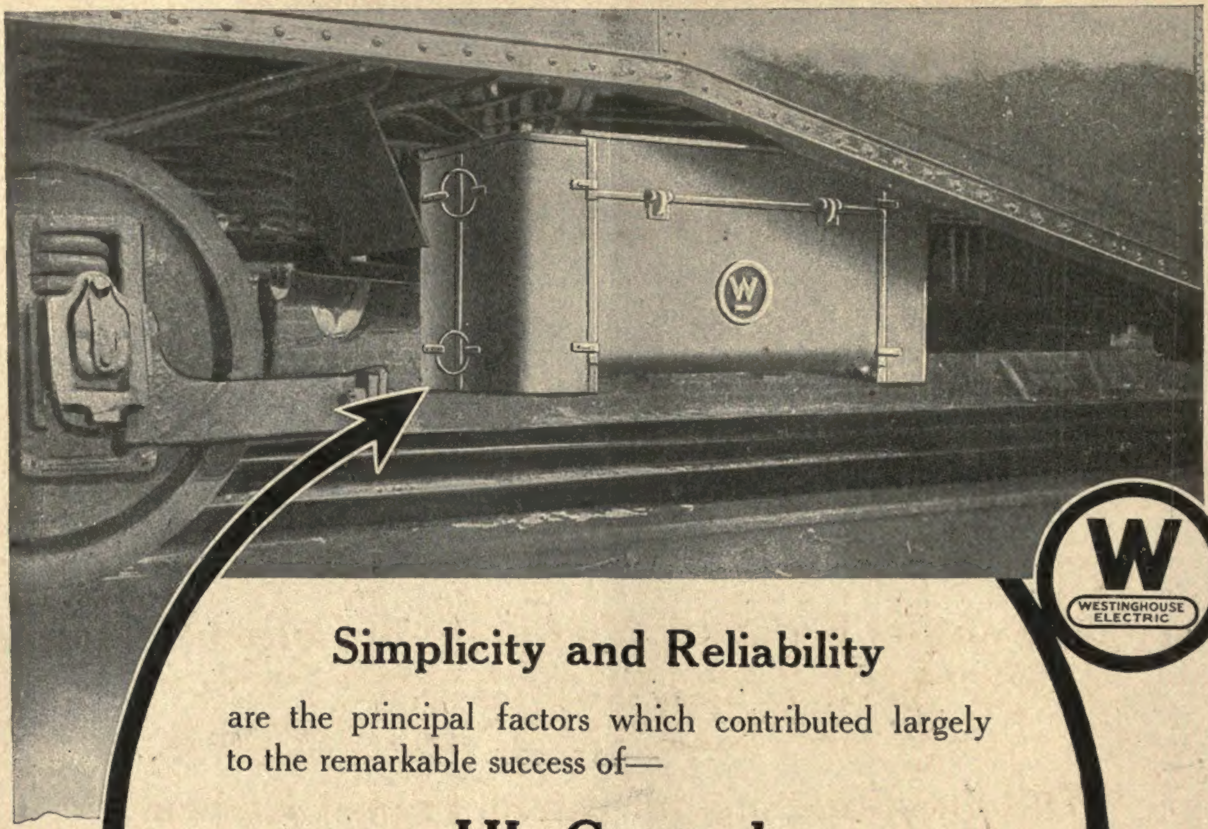


WESTINGHOUSE ELECTRIC

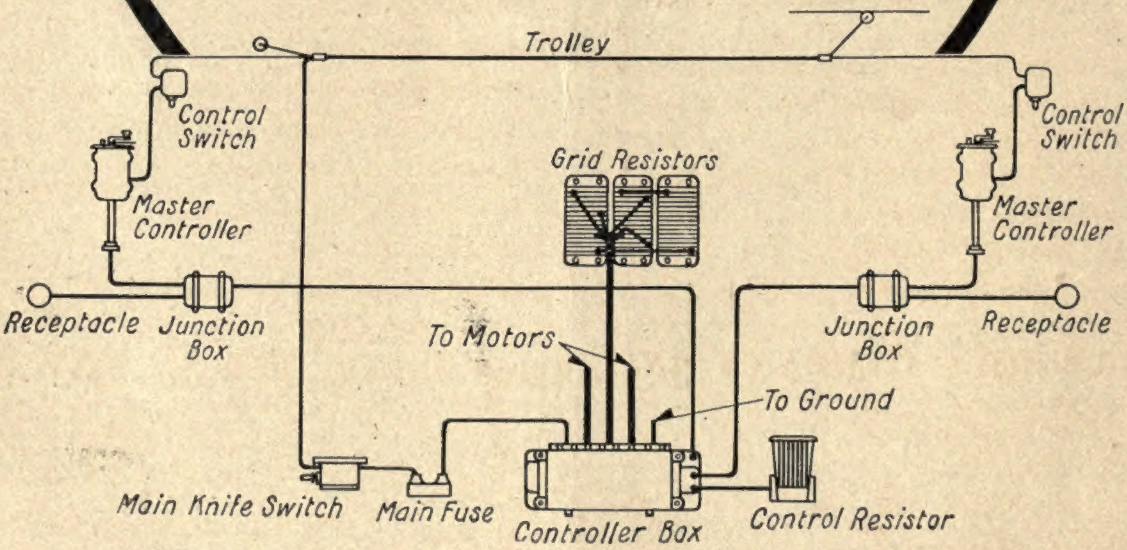
Simplicity and Reliability

are the principal factors which contributed largely to the remarkable success of—

HL Control

The list of over 200 roads using HL Control testifies as to its reliability, and the diagram below shows its simplicity.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.



General Arrangement of Apparatus and Wiring

Westinghouse

Vol. 56, No. 19 New York, November 6, 1920 Pages 953-996

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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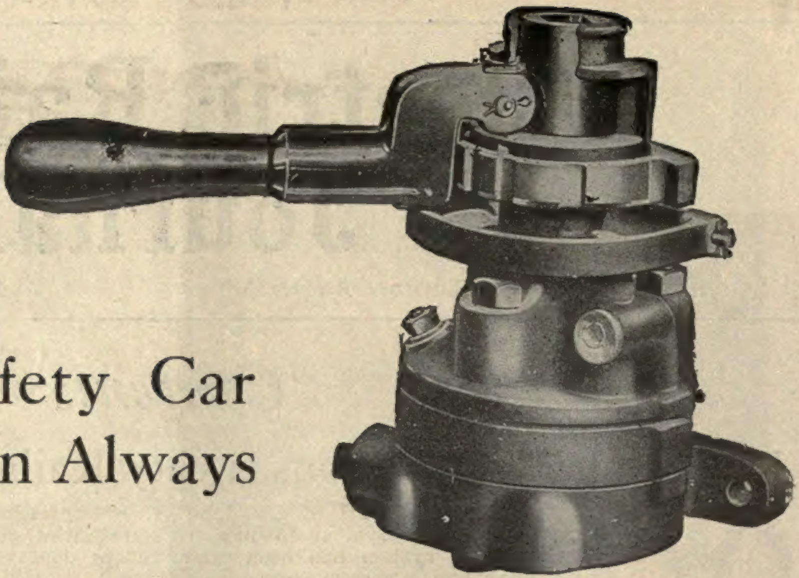


The Real Safety Car
Pleases the Men Always

"The men left their jobs because they did not consider the cars adequately equipped for one-man operation."

So runs part of a recent news item in the *Electric Railway Journal,* proving again that the safety and easy operation of the genuine Safety Car are so well known to the man on the platform that he does not care to operate equipment that *doubles* instead of *halves* his labors.

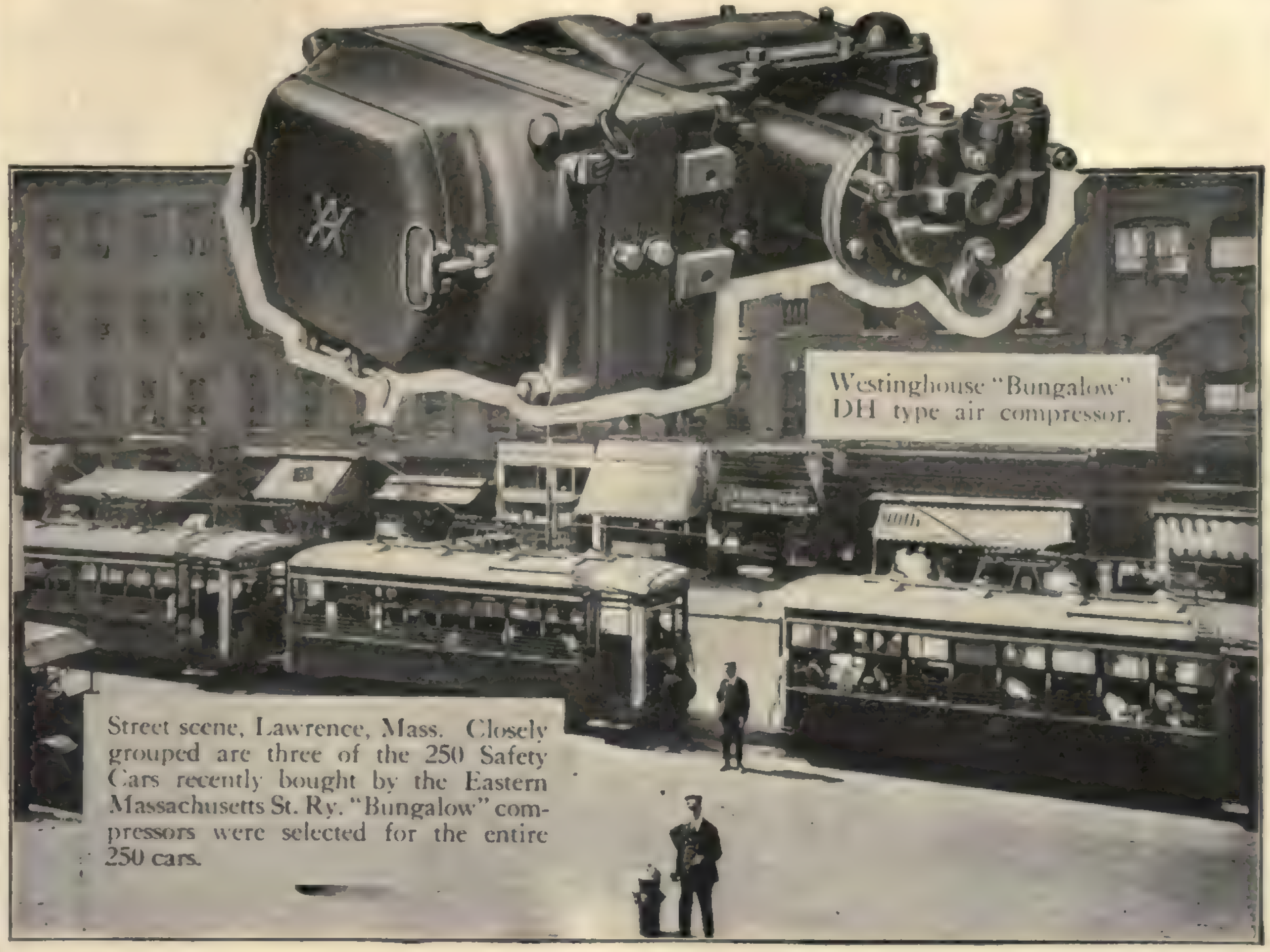
Remember—it is a safety car only when equipped with automatic laborless apparatus, so interlocked that, regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlock for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed before the car can start, and when the air brake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

SAFETY CAR DEVICES CO.

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO	WASHINGTON, D. C.	NEW YORK	SAN FRANCISCO	PITTSBURGH
Railway Exchange Bldg.	Munsey Bldg.	City Investment Bldg.	Southern Pacific Bldg.	Westinghouse Bldg.

CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.



Westinghouse "Bungalow" DH type air compressor.

Street scene, Lawrence, Mass. Closely grouped are three of the 250 Safety Cars recently bought by the Eastern Massachusetts St. Ry. "Bungalow" compressors were selected for the entire 250 cars.

"Bungalow" Air Compressors

—assure an ample supply of compressed air for brakes, door, step and safety interlocking devices of the Safety Car. All the largest orders have specified them—Brooklyn, 200; Eastern Massachusetts, 250; Public Service Corporation of New Jersey, 200.

The "Bungalow" is installed on 3306 Safety Cars operating on 185 electric railways in the United States.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices, Pittsburgh, Pa.
Works, Wilmerding, Pa.

New York
San Francisco

Washington

Chicago
St. Louis

Phono-Electric

—the only trolley wire on four tracked Canal Street

When a city is busy enough to have a four-track line for more than a mile on its main highway, it is wisdom to build each part of the line as durably and efficiently as possible.

Canal Street, New Orleans, is the most famous thoroughfare of the South, and over every one of its four tracks is that best form of overhead service insurance known as

Phono-Electric Trolley Wire

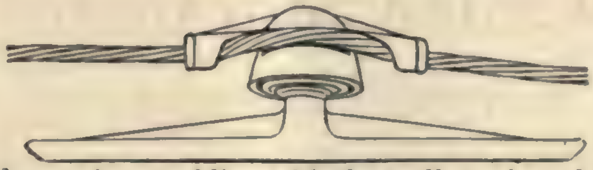
Operators of electric railways over busy highways can afford to use none other than Phono-Electric. For ability to resist wear, blows and arcing it stands alone.

Bridgeport Brass Company

Bridgeport Connecticut

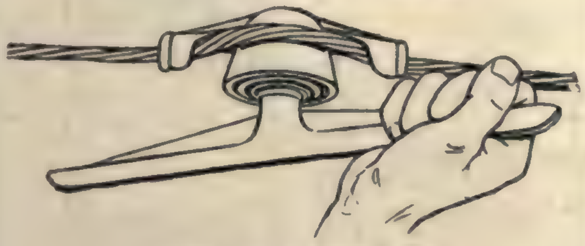
OB PRODUCTS

Quality First

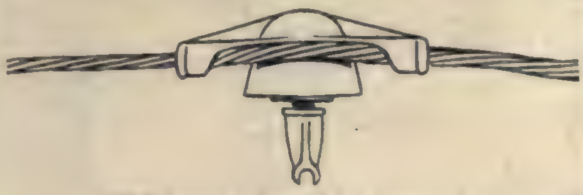


Usually the car is out of line with the trolley wire when it first makes contact with the hanger

With Ordinary Hanger—

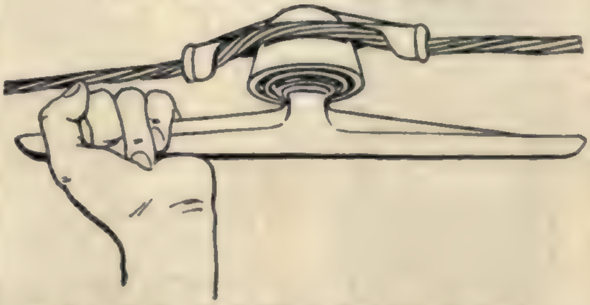


the ear must be backed off—

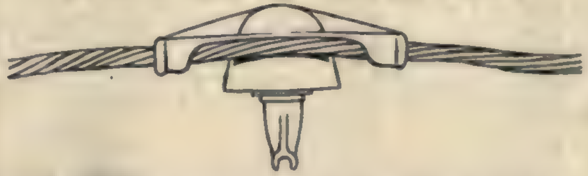


which leaves a loose joint between ear and hanger.

With O-B Lock Hanger—

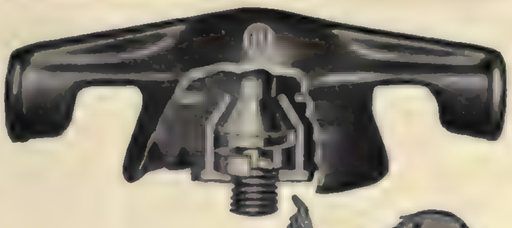


the ear is turned still further and makes a



tight, solid joint between lock hanger and ear when the latter comes in line with the wire.

That Internal Lock Washer Improves Your Line



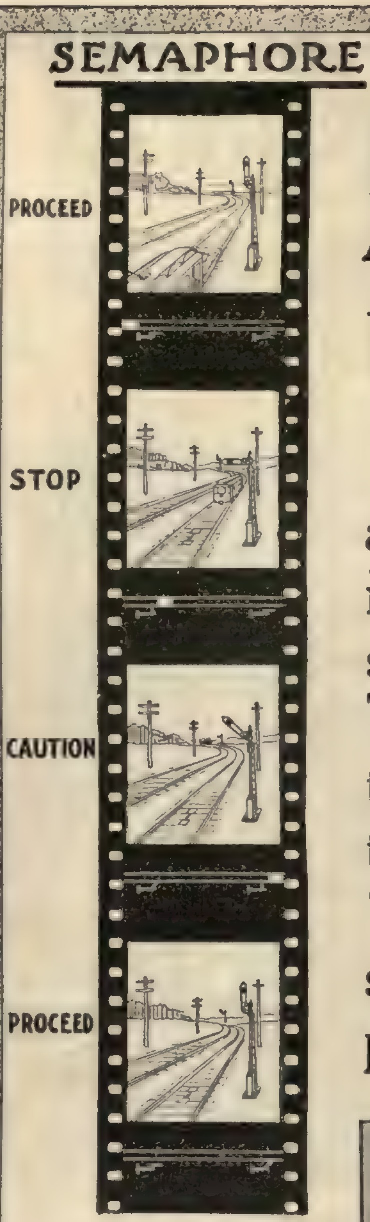
Tight, weatherproof joint between every ear and every O-B Lock Hanger cuts your maintenance cost. With the ordinary hanger either much time is wasted shimming up the joint or the lineman lets it go as a sloppy job.

This never occurs with O-B Lock Hanger. In addition they have all the essential mechanical and electrical characteristics.

A size and type for every service shown in O-B Catalog No. 17.

THE OHIO BRASS COMPANY

Mansfield, Ohio

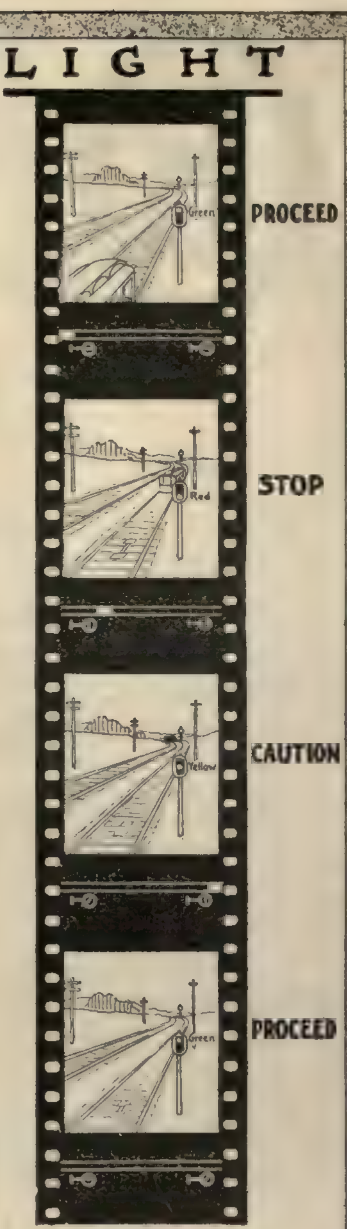


FOR DOUBLE TRACK *Interurban Railways*

Union automatic ▣ block signals ▣

afford a simple system of indications easily understood by trainmen.

The continuous A. C. track circuit makes possible the use of "polarized" or "wireless" control and insures the display of the proper indication at all times.



On the New York State Railways

On the Oakland, Antioch and Eastern

UNION EQUIPMENT WILL SOLVE YOUR INTERURBAN TRAFFIC PROBLEMS

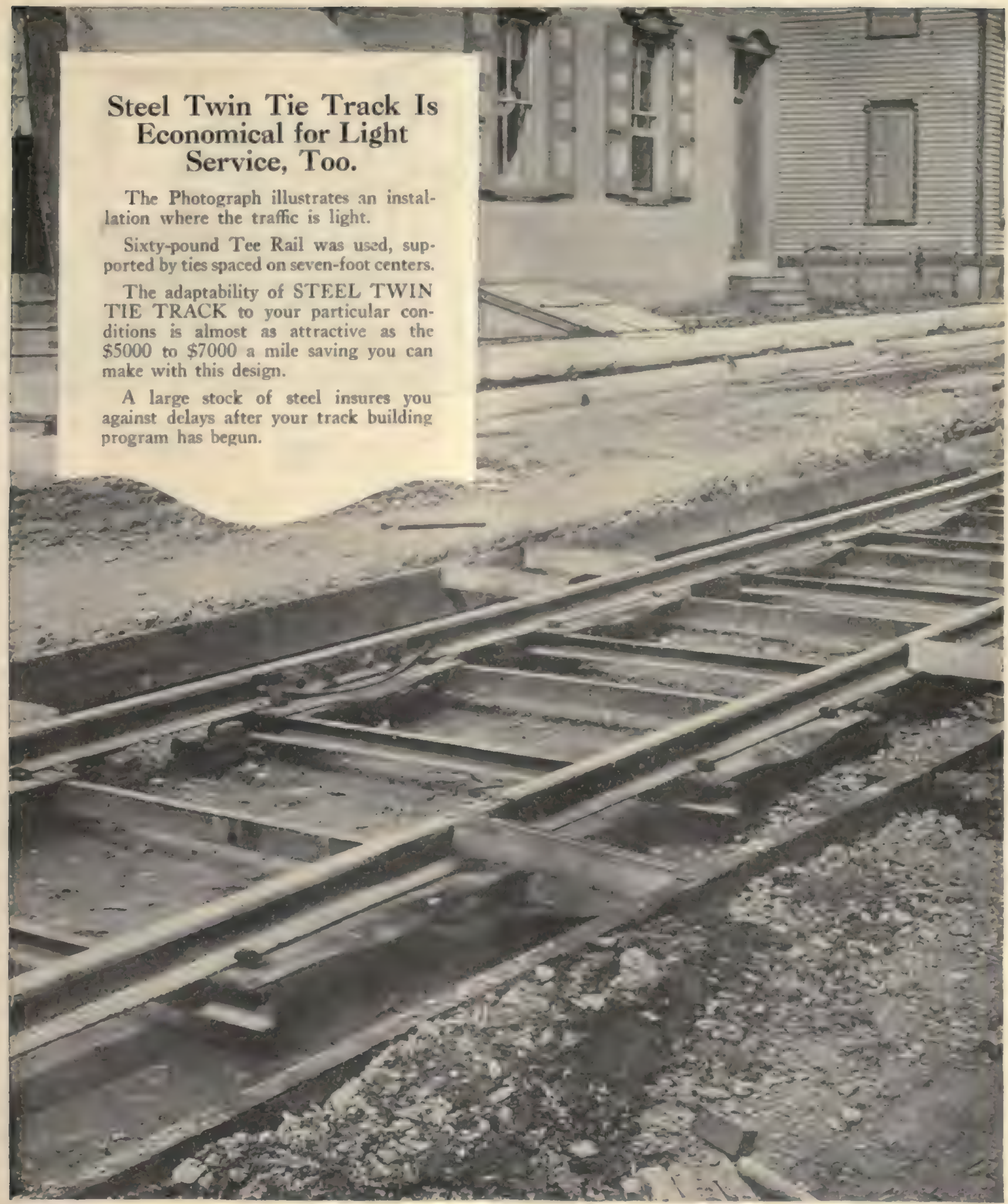
Let us study your operating conditions and cooperate with you in considering what *automatic block signaling* will do for *your line.*

Trade Mark

Union Switch & Signal Co.

SWISSVALE, PA.

Trade Mark



Steel Twin Tie Track Is Economical for Light Service, Too.

The Photograph illustrates an installation where the traffic is light.

Sixty-pound Tee Rail was used, supported by ties spaced on seven-foot centers.

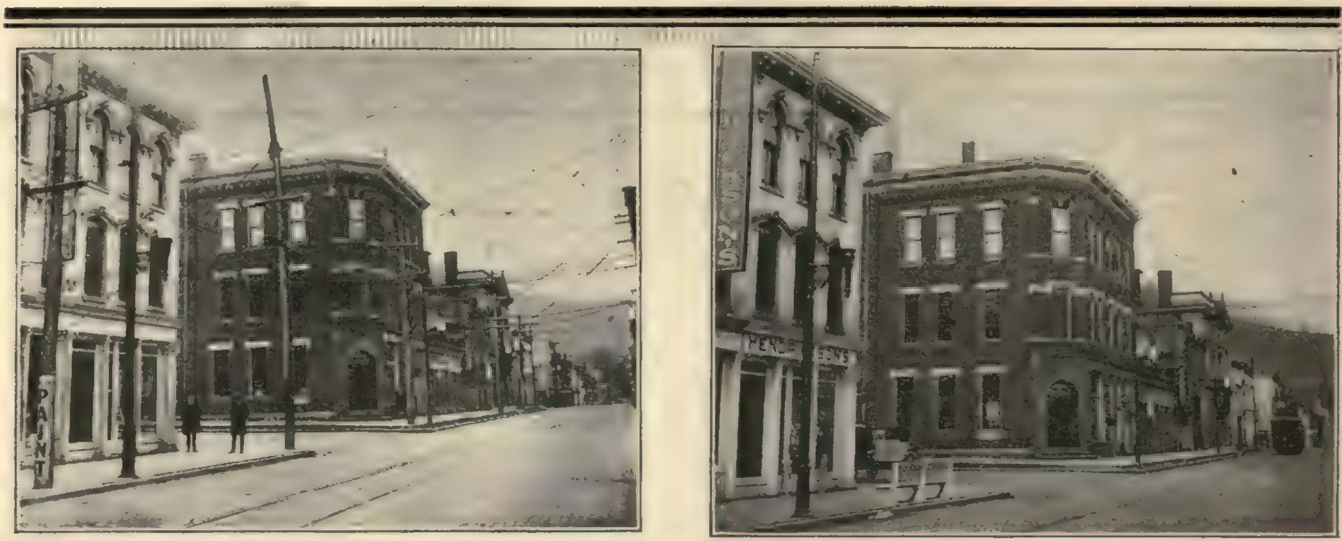
The adaptability of STEEL TWIN TIE TRACK to your particular conditions is almost as attractive as the $5000 to $7000 a mile saving you can make with this design.

A large stock of steel insures you against delays after your track building program has begun.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio



Maysville, Kentucky, showing street scene before and after Elreco Combination Railway and Lighting Poles were installed.

Here is a splendid argument for increased fares

If the electric railway company favored the elimination of old heavily-laden wooden poles, and dilapidated span construction, it would be much easier to receive an unbiased hearing on a fare increase than if it assumed an arbitrary attitude when approached on the subject of overhead wiring conditions and new pole lines.

Let the Street Railway Company approach the Chamber of Commerce with a proposition to *share* in the expense of securing brilliant night illumination and eliminating the tangled web of wires from overhead on main thoroughfares

—in other words, sell the idea of a "White Way" to your town or city.

—and sell it in the least expensive way, with "Elreco" Combination Railway and Lighting Poles.

Many big and small municipalities all over the country have endorsed this plan. Write for Catalog F containing numerous installation pictures.

Electric Railway Equipment Company

Cincinnati, Ohio

30 Church Street, New York City

These Keystone Specialties are Standard Equipment on nearly all Safety Cars.

Golden Glow Headlights

Keystone Rotary Gongs

Keystone Air Sanders

Keystone Trolley Catchers

Faraday Car Signal Systems

Keystone Steel Gear Cases

Keystone-Hunter Destination Signs

Always specify them for they will serve you well. Write for Bulletin No. 167, showing many other Keystone specialties for use on safety cars.

What's In This Book?

Specify These for Your Safety Cars

Bulletin No. 167

Just this—pictures of all Keystone Car specialties which are standard equipment on the Birney Safety Cars. Besides you will find in it other specialties which will make for still greater efficiency and economy in the operation of this car.

This book is quite attractive and should be before you when you are buying Safety Cars.

Copies of it will gladly be sent on request.

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church St.

CHICAGO
Monadnock Building

Canadian Distributors: Lyman Tube and Supply Co., Ltd., Montreal, Toronto.

In the construction of new road-bed, an important factor to be considered is

Resiliency

A resilient road-bed is not only less noisy and more easy riding, but lessens wear and tear on equipment.

Dayton mechanical ties afford this resiliency so important in modern track construction. A cushion of asphalt is the shock absorbing medium. Result—Resiliency.

Build your track with no comeback.

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

EXACTLY SO

Standardize! *Pneumatize!*

Re Lower Platform Expense

Says Alexander Jackson of the Committee on Economics of Schedules, American Electric Railway Transportation & Traffic Association, 1920, and Superintendent of Timetables, Public Service Railway of New Jersey:

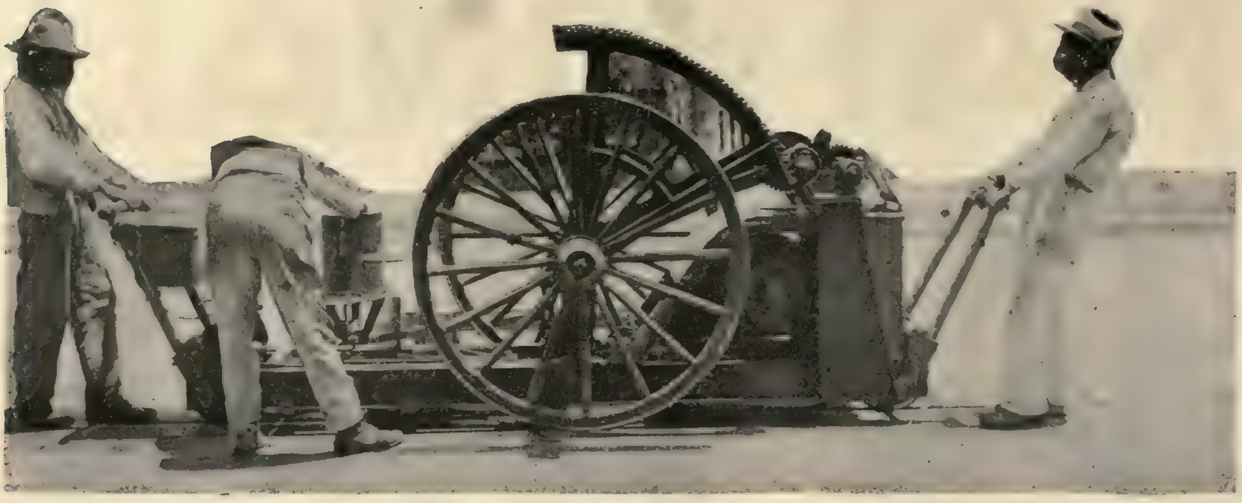
> "On a line operating a speed of 8 mph at a wage scale of 60c per hour per man, or, $1.20 per hour per crew, the (platform) cost is 15c. per car-mile.
>
> "If the schedule speed could be increased to 9 mph a saving of 1⅔c. per car-mile could be made in platform cost, and if increased to 10 mph a saving of 3c. per car-mile would result. If an increase in wages was made to trainmen, making the rate 65c per hour per man, or $1.30 per hour per crew, it would only be necessary to raise the schedule speed to about 8.7 mph to absorb the increase and keep the car-mile rate constant."

Higher schedule speed without altering or replacing your motive equipment is attainable at *an increase in safety* with *National Pneumatic* Door and Step Control, Door and Step Mechanisms, Motorman's Signal Lights, Safety Interlocking Door Control and Multiple Unit Door Control.

Thousands of cars prove our case!

National Pneumatic Company, Inc.

50 Church St., New York **Edison Bldg., Chicago**
Works: Rahway, N. J.



Fifteen Reasons Why

The Reciprocating Track Grinder

is in general use on the largest electric railways in this country and abroad

1 Entirely satisfactory for grinding joints, corrugations, or special work.

2 Operated by unskilled labor.

3 Minimum of metal is removed from rail head.

4 Simple design, ruggedly built.

5 Produces a finished surface which cannot be equalled with other grinders.

6 Impossible to damage rail.

7 Detachable outrigger provided with track wheels for mate rail adjustable to gauge.

8 Safety springs on derailing hoists prevent injuring operators.

9 Forty seconds to remove machine from track and to recommence grinding.

10 Shipped ready for use.

11 Occupies small amount of space.

12 Always ready for emergency.

13 Reduces track maintenance.

14 Results in a smooth easy-riding track surface.

15 Saves cost in short period of time.

RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia

Exclusive Agents—West

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Chicago, Ill.

ELECTRICAL ENGINEERING & MANUFACTURING CO.
Pittsburgh, Pa.

Exclusive Agents—New England

CHAS. N. WOOD CO.
Boston, Mass.

HITCHCOCK, LLOYD & CO., Inc.
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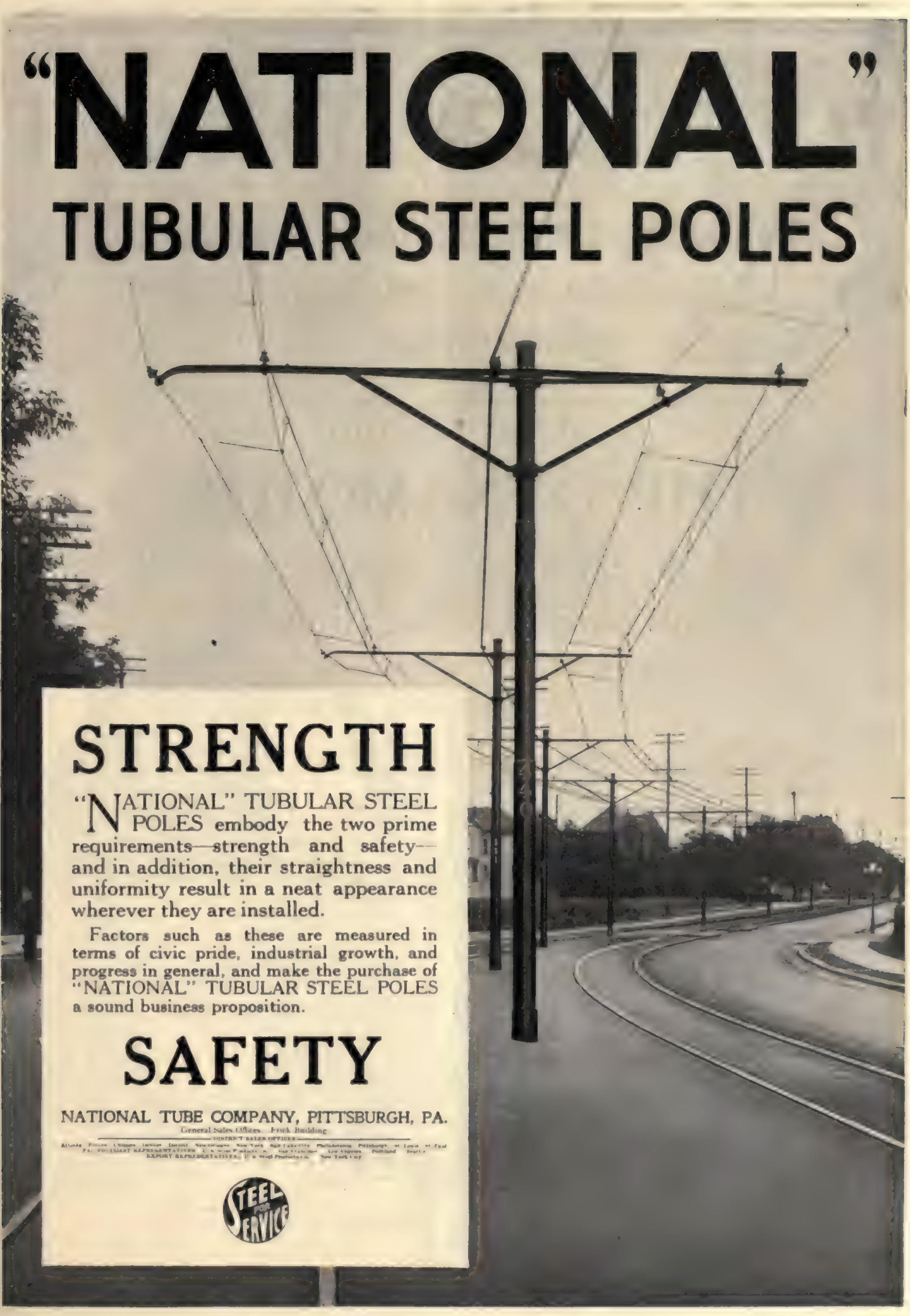
London, England



"NATIONAL"

TUBULAR STEEL POLES

STRENGTH

"NATIONAL" TUBULAR STEEL POLES embody the two prime requirements—strength and safety—and in addition, their straightness and uniformity result in a neat appearance wherever they are installed.

Factors such as these are measured in terms of civic pride, industrial growth, and progress in general, and make the purchase of "NATIONAL" TUBULAR STEEL POLES a sound business proposition.

SAFETY

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
General Sales Offices Frick Building
DISTRICT SALES OFFICES
[illegible]
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STEEL FOR SERVICE

YOUR 1921 BUDGET

Should include welding of track in paved streets and good bonding for open track.

One machine

THE DYNAMOTOR!

will do all of the above as well as your shop welding, building up cup rails, etc.

Make your old rail last another ten years and do it by the least expensive method on the market.

Ask Any Progressive Street Railway their opinion!

Rail Welding and Bonding Company
Formerly The Lincoln Bonding Co.
RW&B
Cleveland, Ohio.

London Representative: Electrical Apparatus Export Corporation, 408-9 Bank Chambers, High Holborn.
New York Office: 30 Church Street
Chicago Office: 343 So. Dearborn Street

TONCAN METAL CORRUGATED CULVERTS

One thing that is instantly noticeable about Toncan Metal Corrugated Culverts is their perfect construction.

The view below reproduced thru the courtesy of the Canton Culvert & Silo Co., Canton, Ohio, shows a Toncan Metal Culvert in the final process of construction, that of riveting. Note how each rivet is securely driven in just the right place—how perfectly the entire culvert is constructed.

The care exercised here is typical of that used by every other manufacturer of Toncan Metal Culverts—and it is just such careful construction that enables Toncan Metal Culverts to give their maximum length of service.

As for Toncan Metal itself, to the best of our knowledge it is the most durable metal made (from iron ore). It successfully resists the action of rust for years and years.

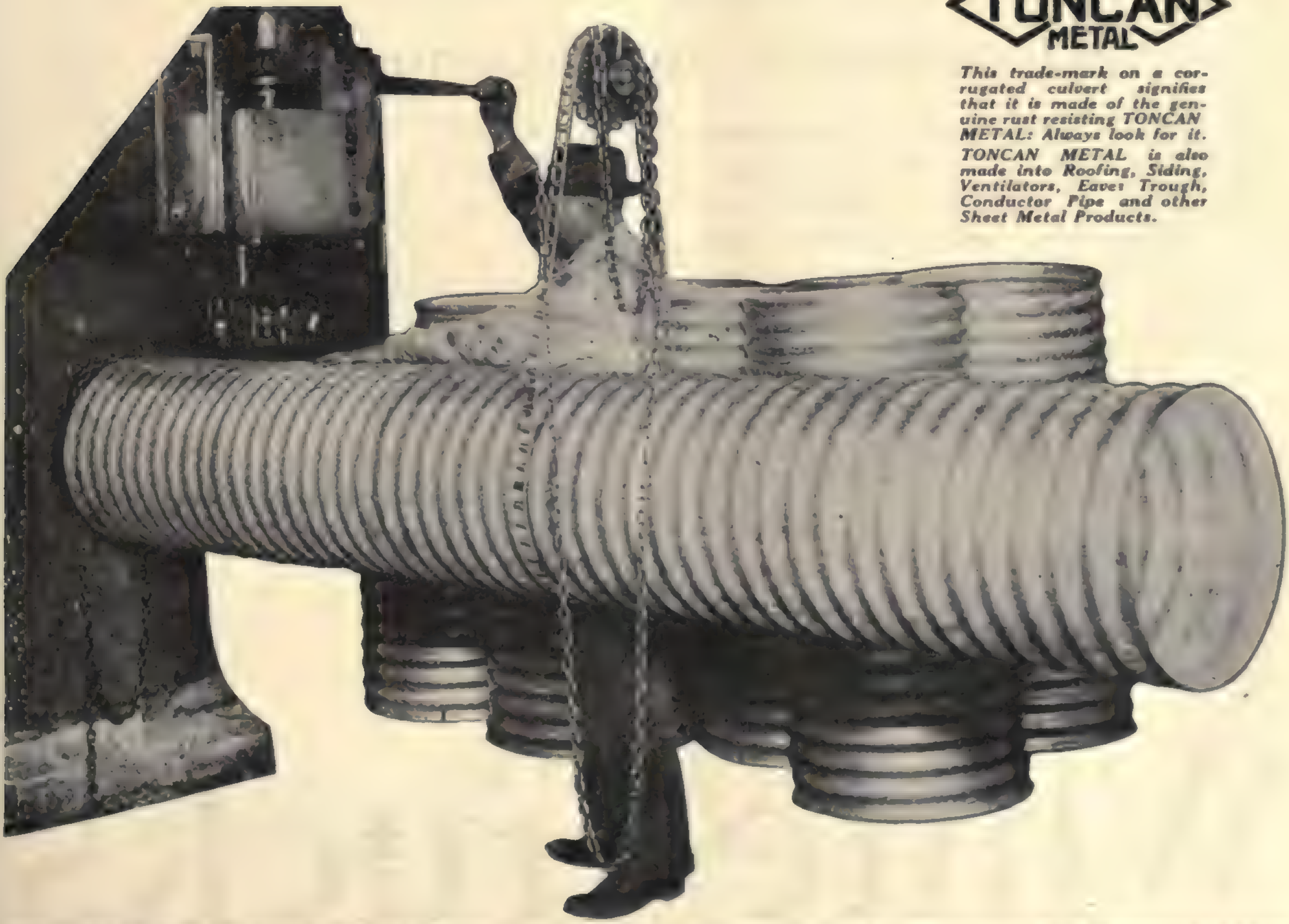
Write for the facts about Toncan Metal Culverts.

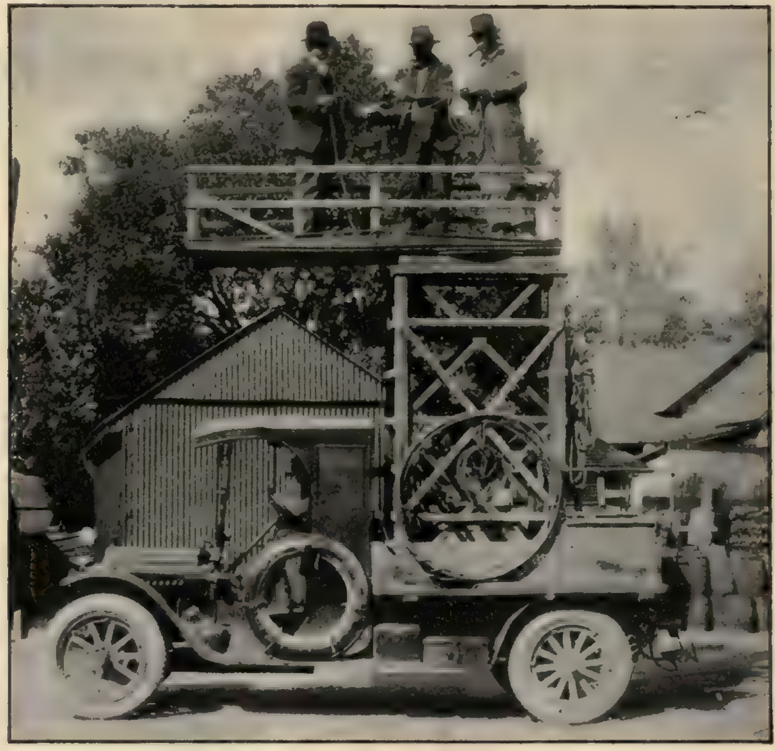
The Stark Rolling Mill Co., Canton, Ohio
Sole Makers of Toncan Metal

SPC.
TONCAN
METAL

This trade-mark on a corrugated culvert signifies that it is made of the genuine rust resisting TONCAN METAL: Always look for it.

TONCAN METAL is also made into Roofing, Siding, Ventilators, Eaves Trough, Conductor Pipe and other Sheet Metal Products.





White Tower Truck, one of three Whites owned by Dallas Railway Co., Dallas, Tex.

"Dependable and Economical"

THE Dallas Railway Company operates three White Trucks—two with towers for overhead construction work, and one with stake body for hauling materials and freight to construction jobs. They are always ready for the emergency runs demanded in street railway maintenance work, and have given faithful service since their installation.

"We have found our Whites to be efficient, dependable and economical," says B. T. Brown, Superintendent of Ways and Structures. "We have yet to experience any delays due to the fault of our trucks."

White Trucks are constructed to give dependable and economical service over a long period of years. The finest workmanship combined with highest quality materials gives White purchasers the best motor truck value. Owners' cost records show they do the most work for the least money.

THE WHITE COMPANY
CLEVELAND

White Trucks

Sherman Service
Is a NATION-WIDE Service

In ten years, Sherman Service has developed a country-wide organization. Our thirteen offices with a personnel of over a thousand specialist-members serve many hundreds of clients, including concerns employing over **100,000** workers each. Every field of manufacture and transportation is represented; our service has proved its value by producing *results* of co-operation, harmony and production. The following industries form but a part of our satisfied clientele:

ELECTRIC STREET RAILWAYS

Asbestos
Automobiles
Bleaching
Boxes
Building Construction
Candy
Celluloid
Cement
Cigars
Clothing
Communities
Corsets
Cotton
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Department Stores
Dye Works
Electrical Equipment
Engines
Foundry
Furnaces
Furniture
Gloves
Glue
Governments
Hats
Hosiery
Implements
Lace-making
Leather
Lumber
Mining
Oil
Paper
Pianos
Pipes
Publishing
Railroads
Razors
Rubber Goods
Rope
Shipbuilding
Shoes
Silk
Stone-cutting
Stoves
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Trade Associations
Trucks
Underwear
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What we have accomplished for others, we can do for *your workers.* Call one of our representatives for a conference on *your* human element problem.

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Boston
10 State St.

Providence
10 Weybosset St

Montreal
Drummond Bldg

St. Louis
314 No. Broadway

Toronto
10 Adelaide St., East

Largest organization of its kind in the world.

SHERMAN SERVICE

Copyright, 1920, Sherman Service, Inc.

What the Committee Found

At the recent Convention of the American Electric Railway Association at Atlantic City, the Committee on Collection and Registration of Fares made a comprehensive report of which the following are abstracts:

Your Committee believes that—

1. The experience of the past year confirms the preference for the use of metal tickets expressed by the Committee last year.
2. The experience of many companies now indicates that a substantial differential between a cash fare and a metal ticket is desirable in order to encourage the use of the metal ticket. There is, of course, ample justification for a higher cash fare because the transient and occasional riders who do not desire to purchase tickets should pay a higher fare for service which is always available for their use.
3. For the large number of cities, a cash fare of 10c would not decrease the riding habit sufficiently to prevent the obtaining of needed increases in net revenue, and that in very many cities this 10c fare is absolutely necessary for adequate service and restored credit.
4. If an average fare in excess of seven cents is necessary to establish credit and allow proper service, we would recommend a ten cent cash fare with such reduced rates, if any are desirable, preferably through the use of metal tickets, as will produce the needed average fare.

This Report speaks for itself. It is the voice of the industry, showing the results of mature judgment based on careful study of fare collection problems.

So that you may see how the conclusions of the Committee coincide with our views we recommend that you read our latest pamphlet, FARE FACTS, a copy of which will be sent you on request.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.

The history of *Galena Service*, as represented by the master organization of mechanical experts maintained by this company, is one of exceptional accomplishment in effecting efficient and economical operation. Through the personal and practical co-operation of these lubrication specialists, thousands of dollars are saved annually to the traction lines of America, in time, reduction of repair bills and extra mileage attained through the use of the right oil in the right place.

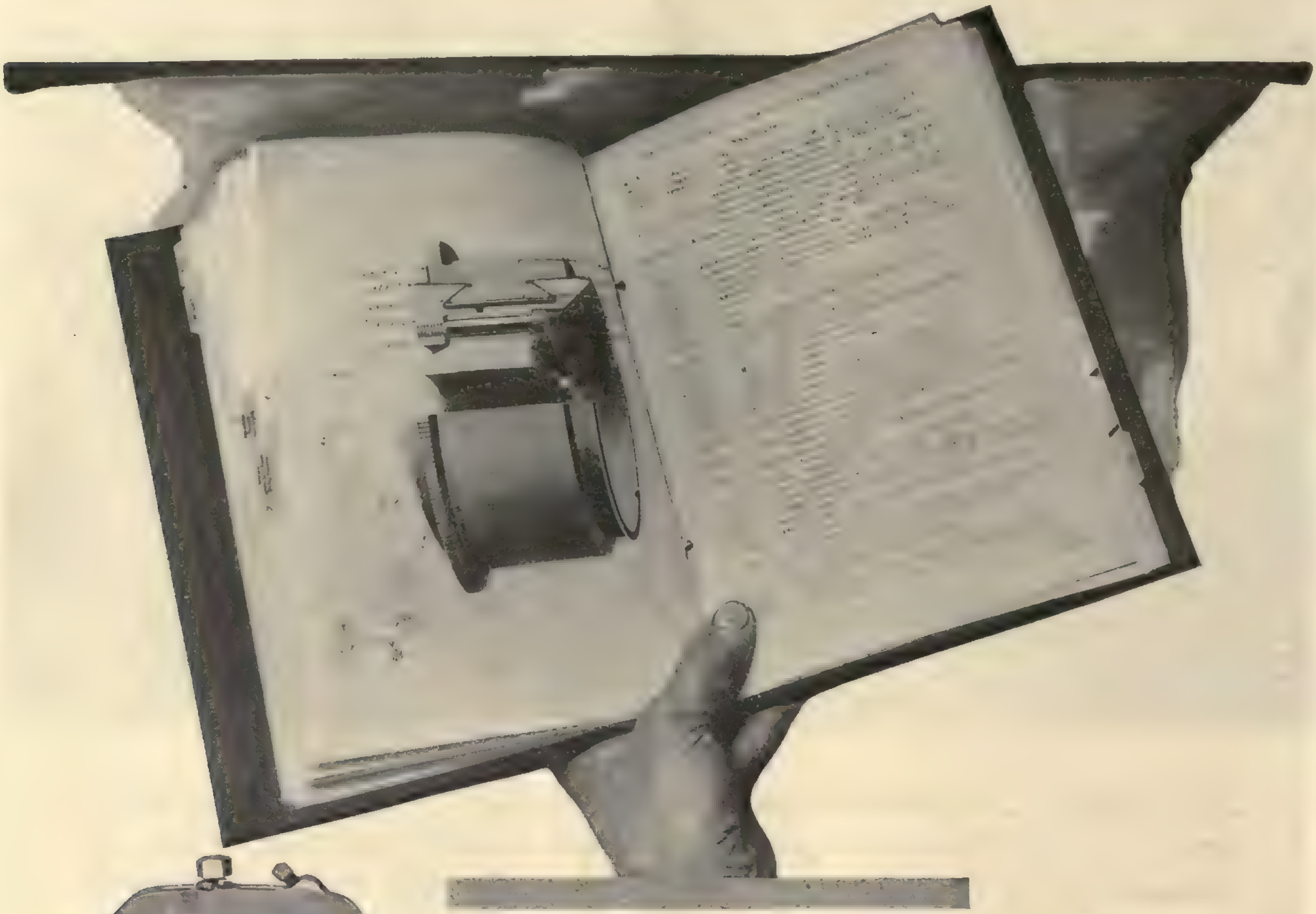
Galena Service does not deal in guesswork or experiment, but demonstrates the successful methods that have been perfected through fifty years of practical experience—methods that are daily proving their value on hundreds of electric railways.

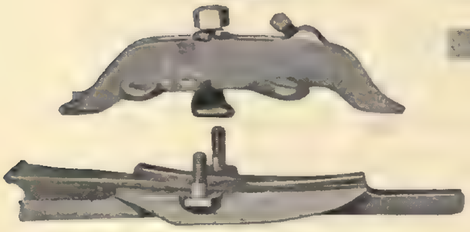
When Galena Service Goes In—
Lubricating Troubles Go Out!

Galena-Signal Oil Company

New York *Franklin, Pa.* *Chicago*
and all principal American cities
LONDON TORONTO BUENOS AIRES MONTREAL PARIS

Every good railway man knows he cannot keep his equipment working at high efficiency if he picks renewal parts at random





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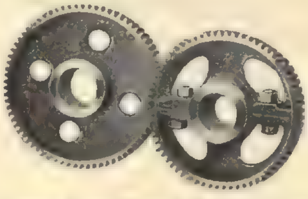

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Electric Railway Journal

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This Week's Election and the Electric Railways

POLITICS is not the province of this paper. The result just recorded at the polls, however, touches intimately the affairs of every one of us. Whether the result pleases or displeases the individual, the decision just made marks the beginning rather than the end of a new order. The Republican party will be on trial. Not only that, but the whole system of two-party government will be on trial. Restlessness and discontent are abroad. The problems that will come before the new administration cannot be solved by the application of the comfortable formula of old-fashioned conservatism, however well intentioned. The return to "normalcy" must be to a "normalcy" that shall be tolerant, far sighted and not in the interest of any one class. The need is for wisdom, sympathy, vision, courage and progress, especially progress. And the way to progress is over the orderly road of evolution.

When Senator Harding was nominated in June, we commented on the breadth of vision which he possessed in regard to public utilities, as exemplified in his address at the midyear convention of the American Electric Railway Association last January. Under our system of government the electric railways must depend for relief far more on the state governments than on the national authorities. Nevertheless, the railways can well be pleased that the highest office in the land is to be filled by one well acquainted with their problems, and the increasing tendency for central control of various matters in which the railways are concerned is another reason why utilities need have no cause for worry over the political events of the present week.

The Meek No Longer Inherit the Earth

QUEER things are done in the name of arbitration. According to public accounts a body of this kind at Boston has reinstated with full pay back to last July a motorman who swore at his starter. Billingsgate is never elegant, but then we are told that strong men are prone to use strong language and that "motormen and conductors are not always selected for their linguistic purity." "Moreover," say the arbitrators, "the Eastern Massachusetts Street Railway is no religious organization." The new doctrine is further pronounced that "it is more important to the public that efficient and capable motormen be permitted to serve the public than that the sensitive ears of the officials should not be shocked by the rude language of angry employees." Thus, new ramifications, are apparent.

We do not like to appear too facetious, but, carried to its proper conclusion, may we not assume that the starter would have the right to swear at the division superintendent, the division superintendent to swear at the manager and the manager at the president? Perhaps the president could swear at his directors and the directors in turn swear at the stockholders. But at whom would the poor stockholders swear? At the politicians? We give it up. We are not arbitrators and our minds are finite. In this particular case the punishment may not have fitted the crime, but it is quite another thing to condone the crime, for such it was in a way. Silence no longer appears to be golden. The meek no longer inherit the earth.

Management, by Commission

THE recent fare change in Philadelphia is another example of what the JOURNAL in the past has called management by commission as contrasted with supervision and regulation, the legitimate function of public utility commissions. The electric railway industry and, in fact, all public utilities are vitally interested in the continuation and proper functioning of public utility commissions. They form the one great and real practicable means for the proper adjustment of relations between the public and the utilities—the one defender of the rights and privileges of both. What we have to say here is with the purpose of adding our bit toward strengthening the position of the commissions in the performance of their legitimate work.

As to the facts in Philadelphia, the JOURNAL commented in the issue of Oct. 23, and all data obtained since go to strengthen the belief that the commission made its own decision as to the kind of a fare scheme and the amount of the unit fare. There is no question here raised against the purpose of the commission. There was evident desire to provide the necessary revenue for the company. Our brief is that the determination of a fare scheme and the amount to be charged are primarily managerial functions, and that while a commission should protect the public against rates of fare which are notably too high or markedly discriminatory, it should be most careful about enforcing its ideas as to the kind of fare to be charged and the methods of collecting it. This is particularly true in the case of a company which admittedly needs relief and whose future may depend upon the success or failure of the new fares adopted. It is the company which must operate under the scheme and must bear the burden of failure if the plan is unsuccessful. Finally, it is natural to expect that a company, like an individual, will work harder to make things come out right if it follows a scheme of its own devising and in which it thoroughly believes than one imposed upon it and whose efficacy and justice it doubts.

A discussion of the relative desirability of the two fare schemes proposed is purposely avoided here. It isn't the question of fare schemes we desire to analyze at this time. What we would point out is the danger to commission regulation of the too-ready attitude of commissions to perform managerial functions.

Fares Cannot Recede Yet

BECAUSE of the present flurry in the prices of a few articles—chiefly luxuries or things whose purchase can be put off—there are suggestions in some quarters that the time has come for stopping increases in fare, limiting increases to periods as short as six months or even demanding a cut. Those familiar with the chief expense accounts of electric railways know how unjustified these suggestions are. So far from enjoying a reduction in operating expenses, all coal-using electric railways find that their second largest item of cost has taken to further skyrocketing—first in the permanent rise due to the new boost in freight rates; second, in the, let us pray, temporary rise due to worldwide bidding and consequent selling at the highest price to the neediest bidder. Coal, unhappily, is so ponderable that the freight increase alone is enough to offset any possible shadings in the prices of less bulky and longer-lived material.

If, then, King Coal is unassailable, can anything be done to King Platform? In all justice to the men, we think not. The papers may be full of price cuts here and price cuts there, but the motorman's wife hasn't noticed that the price of eggs, milk and bread—the everyday necessities—have hit the toboggan, although pongee silks and twin-six sedans are going a-begging. As for rent, what used to be one-sixth of a frugal family's budget is now one-third, while those who are their own landlords can fully appreciate their employers' coal difficulties.

These are the unadorned facts for those who are daydreaming about pre-war price standards in fares or other commodities. Even if the miracle of really lower prices did come to pass most of our electric railways would have to see many a month go by before they had wiped out war and post-war deficits. So don't let the amateurs jump to conclusions because there's a silk panic in Tokio and a sugar-cured moratorium in Havana. Just tell 'em to keep their eye on your coal bills and platform charges.

Mr. Graham's Address Should Be Read by the Automotive Industry

REGULARLY, and with consistently the same tenor of thought, publicity matter sent out over the name of one or another of several motor truck manufacturers comes to our attention proclaiming the doom of the electric railways and spreading broadcast propaganda which would have one believe that the electric railways are soon to be consigned to the scrap heap. This leads to the thought that it would be a fine thing if arrangements were made for distributing through the automotive field, particularly to the sales and publicity organizations, the recent address of George M. Graham, vice-president Pierce-Arrow Motor Car Company, before the convention of the American Electric Railway Association. Compare the character of the address mentioned to the broad glittering generalities and sweeping condemnation so frequently spoken and written and sent out for the consumption of newspapers and automotive salespeople by other representatives of that industry.

At one point in his address Mr. Graham says: "No motor vehicle manufacturer has ever said that electric trolleys could everywhere be supplanted by motor vehicles. The statistics of passenger traffic on electric railways prove the essentiality of their service." We regret to say that some of the literature which comes to our hands does say repeatedly the very thing that Mr. Graham denies. In another place this gentleman said: "I have conceded that the number of passengers in our great cities is too enormous to be handled by motor buses. . . ." Mr. Graham has taken the trouble to inform himself on the matter, but much of the publicity matter which emanates from the automotive field is written with a profound ignorance of the subject. That is why we should like to see this address receive wide circulation among automotive people.

We fail to take very seriously the rash statements about the doom of the trolley and are more inclined to smile when we read them. Yet they should really be watched and counteracted with the truth, for it is possible that enough of such propaganda may eventually cause a doubt in the minds of the investing public which will react to injure the electric railway industry. This is fairly remote, perhaps, for the matter seems to us so overdrawn, but it is a possibility.

We cannot avoid repeating at this point our opinion that the problem of applying the motor bus to urban passenger transportation is really one for the electric railways to solve. Electric railway managements have the transportation experience necessary. Automotive men will do well to give sober thought to this idea and to consider the benefits of co-operation which will permit their product to be used intelligently in this transportation business.

Shall We Turn the Freight Business Over to Motor Trucks?

IS NO one going to challenge the assertion of Mr. Graham in the address referred to above that "they [referring to electric railways] should not figure too hopefully on freight revenues; in this field they are handicapped, and sound business would dictate the withdrawal of their facilities where they cannot successfully compete with steam railways and motor trucks"? And in another place, "In long-distance movement of heavy tonnage they are surpassed by the steam roads; in short-distance transit of less than carload lots, up to 100 miles, they cannot compete with the motor truck." The sum total of these two statements is that we should turn over the electric railway freight business to the motor truck people and politely withdraw from that line of activity.

If Mr. Graham is right, then practically all forward looking persons in the electric railway industry, including the editors of this journal, have been dead wrong in encouraging and urging the interurbans to get into the freight end of the business, expand facilities and go after this revenue, particularly l.c.l. high-class commodity transportation where high rates for fast service are practicable. Is all of the headway that has been made along this line to be for naught? Is there to be no further expansion of the interurban freight facilities?

This is contrary to the judgment of all the industry and directly opposite to the very rapid expansion in this phase of the interurban business which has been noted nearly everywhere during the last two years. And we would ask Mr. Graham one or two questions.

The motor truck haulage costs are high now. What are these costs going to be under constantly increasing gasoline and oil costs? What will the rates have to be when the public makes its demand that the use of the highways, now furnished virtually free despite astounding destruction, shall be paid for; in other words, when the motor truck must pay a heavy maintenance-of-way expense? What about the net earnings when motor truck companies, established as common carriers, are required to give a regular freight service regardless of the amount of business ready to be hauled?

Just now the going is good for the truck companies, for they have the advantages indicated. There are, furthermore, many places where the motor truck can continue to give a more economic service than the interurban can supply, particularly on the very short hauls. But by and by we anticipate that the motor truck transportation companies will find going (at a profit) continually harder, largely because of the highway situation to which we referred at some length in our editorials on page 529 of the Sept. 18, 1920, issue.

Is the Time Ripe for the Employment of an Engineer of Research?

EVERY one who has followed the activities of the American Electric Railway Association has been impressed with the value and amount of statistical information which the secretary's office has compiled during the past two years. We believe that this is largely the result of the wise course pursued in attaching a special engineer to the office staff for the purpose of supervising that sort of work.

There is reason to believe that the addition to the staff of a special research engineer would also be a step in the right direction. Several of the reports of standing committees presented at the recent convention made reference to the need for first-hand investigation of problems which are national in scope and suggested that the industry as a whole should finance the studies.

Many of the problems which are presented to standing committees cannot be treated properly by these committees because the chief method of gathering informaton is confined to the dubious questionnaire. This is a cold proposition at best. It is almost impossible to prepare questions which clearly state the problem, and it is next to impossible to secure answers upon which to base a résumé of the information which may be obtained. Railway officials are busy, and unless a questionnaire has special appeal it is filed for answer later, and it seldom gets answered. On the other hand, personal visits to various properties in the course of the study of special subjects will always develop information which is worth while.

Most of the information which is contained in the reports of standing committees is the result of the personal efforts of some member or members of the committee who happen to be interested in the subjects at hand. It speaks well for their efforts that so much of their work is well received and is adopted by the associations.

The editors feel that the suggestion made by the chairman of the way committee on the convention floor that the executive committee of the Engineering Association consider the advisability of establishing the office of research engineer, and on a salary basis, is one which merits serious consideration. In this connection it should be remembered that the American Railway Engineering Association has an engineer of tests as a member of its staff, and the work of that association in its study of rail failures has been beneficially guided by the work of that engineer.

Another Step Forward in Standardization

THE last act of the Engineering Association at its Atlantic City meeting was to suggest to the incoming administration the appointment of a committee which would pass upon "anticipatory standards," especially in connection with the design of cars and car equipment. This, we hope, marks the beginning of a really intelligent and constructive effort to direct the design of all types of railway equipment in an engineering way along lines which will ultimately develop standards which will be adhered to and eliminate many small differences in construction.

When a railway official now decides to purchase new equipment or to draw up specifications for its purchase he does not first take down his Engineering Manual and decide on the standard parts to be used, but instead directs investigation along three principal lines. First he reviews the troubles that he has had with similar equipment in operation on his lines and makes certain that the new equipment to be purchased will have ample provision for the correction of these difficulties. Second, he endeavors to obtain information from other users of this type of equipment regarding any difficulties they have had which should be remedied in his design. Third, he aims to duplicate existing equipment on his lines that has proved satisfactory.

This committee would be of assistance to member companies in directing the above class of work and in collecting information from all parts of the country regarding troubles to cars and equipment that should be corrected to perfect design to such a state as would largely eliminate previous difficulties. With complete and accurate data on failures that should be corrected, the committee would be in a position to take up the necessary changes with manufacturers in an intelligent manner, and when the changes have been incorporated various railway officials would have positive assurance that, in adopting the proposed designs for their service, a multitude of unlooked for changes would not be necessary.

From the discussion of this subject that occurred at the meeting it appears that the term "anticipatory standardization" does not convey the broad scope of the work that is to be undertaken. In this work we understand that the committee will look forward in a broad way to the "anticipatory direction of design" so as to provide uniformity wherever possible without blocking advantageous development for the future. It was the sentiment of this meeting that the first efforts of the committee might properly be directed to car designs and particularly to safety car design.

Certainly the electric railway industry will benefit from the economy which is certain to result from more uniformity in design if it can feel certain that every endeavor has been made to eliminate weaknesses so that when a standard is ultimately decided upon satisfactory service can be assured. The association on this its first committee of this sort should have the co-operation of both railway officials and manufacturing engineers in its attempt to make progress along this line. If it is found feasible and practicable to obtain the active co-operation of manufacturers with representatives of the electric railways in the direction of design, this committee's work would have a place of equal standing with the standards committee. Certainly it is true that if more work can be done along this line the work of the standards committee will be considerably lightened.

The Next President and the Electric Railways

LAST JANUARY Senator Harding addressed the midyear convention of the American Electric Railway Association at Cleveland and offered certain suggestions for improvement in the electric railway situation. An extended report of this address was published in this paper at the time. Some excerpts are given below to recall the broad views expressed and the constructive attitude taken by the President-elect on this subject.

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There were some very severe and wholly undeserved penalties on patriotic service during the war period, and which are still applied in its feverish aftermath. But I know of none worse penalized than the electric railway lines of the country. We know they served with splendid zeal and sacrificing devotion. They were as necessary to the stupendous tasks of preparation for war as powder is to the loaded shell.

Let it be recorded that the electric railways responded with every ounce of energy and played the big part of a big factor in doing big things for the nation. The natural inference was that they shared in the award for service. They sustained the heavy burden, and not only have they had no reward, as was given so generously in many instances to big and little business, but were penalized worse than aliens suspected of aiding the enemy.

It is a curious phase of human nature that the people in the populous centers hail transportation lines as the supreme blessing, encourage their construction and celebrate their completion, and then growl about them ever after. Rarely does anybody utter appreciation, though genius and efficiency are nowhere more marked in good service, and no one seems to think of their essential character until traffic is suspended.

Let us not direct our criticism at the awards of the War Labor Board. That body yielded to the flood-tide of war demands which was irresistible. The shocking thing was that the federal government, with limitless assumption of power, should command doubled expense accounts and remain deaf to all appeals for the means of meeting them absolutely.

Let us not go back to the crimes of exploitation and frenzied finance. All that has been established and properly criticised and fully condemned. Here was a five-billion dollar public service enterprise, accommodating fifteen billions of passengers a year. Its continued operation was a necessity in peace or war but vitally necessary to war production. The government exercised the power to increase burdens, but had no power, or having had it, no inclination to help in meeting these burdens.

In effecting the restoration, we must wipe out the contributing causes and make sure from this time on that honest investment in honest public service shall receive an honest return for that public service. The capital which seeks to render a necessary public service merits a square deal and it must have it.

I believe in strictest regulation without conflicting authority, because all public utilities must yield to the voice of public interest. But the same power that protects the public must protect the public servant, whether that servant is capital or the workman who operates the utility.

Destroyed credits must be restored, and flexible scales of charges must be provided, so that a public may pay justly for that which it demands. The exploitation of ten or twenty years ago justifies no failure in good faith today. The public which is served has an obligation no less than that of those who serve it.

The men deserve to be well paid. I think it is fair to say that most of the increased awards the public has approved. But the public ought to pay precisely as it approves, because justice is not a favor to one, it is the right of all involved.

Rerouting Plan to Save $620,000

Sections VII and VIII of Beeler Report on Kansas City Railways Recommend Complete Rerouting of the System to Produce Substantial Economies and Improved Service — Kansas City, Kan., System Made Independent of Missouri System, with Trunk Line Interconnection

FIFTY less cars in the daily schedule requirements, 750 less car-hours per day, or $480,000 less expense annually in trainmen's wages, power costs and car maintenance items alone, are the savings which are expected to result from the installation of the rerouting recommendations for the Kansas City Railways in Kansas City, Mo., as worked out by John A. Beeler, electric railway consultant, after extended study. A similar rerouting of the lines in Kansas City, Kan., is expected to result in a saving of $140,000 a year, making a total for the whole system of $620,000. These rerouting plans form Section VII and VIII of Mr. Beeler's Kansas City report, these having been recently submitted to the Board of Control. The most interesting part of these proposed changes is that while so large an operating economy will be achieved, yet the service to the public will be improved. A substantial reduction in street congestion is also expected to accrue.

THE REROUTING PLAN

The report for Kansas City, Mo., states that this rerouting has been undertaken to improve service, to mimimize downtown congestion and to reduce operating expenses, but that many incidental benefits will accrue. The rerouting plan recommended will very largely reduce the turning movement of cars in the congested business district and will eliminate more than 1,000 car movements through the downtown intersections in the evening rush hour, or 20 per cent of the total. All street traffic will be accelerated, so that the general public will be benefited as well as the patrons of the company. The report also points out that while there is a reduction in the number of cars per hour which will pass through the business streets, it will be entirely in those which now run lightly loaded, as many of the cars will be able to discharge one load and pick up another. In fact the number of cars available to bring in and take out passengers will be greater than before.

Another advantage which is expected to accrue is that the rerouting plan will enable the maintenance of better regularity of service. The report points out that in some cases through-routing necessitates a greater length of route, but since lines terminating downtown have no chance to adjust their leaving time, the regularity of cars under the new plan will undoubtedly be better than before.

Referring to the problem of making the recommended change, in his letter of transmittal to President Philip J. Kealy, Mr. Beeler observes that "the achievements of your operating force in the past six months have been very noticeable, and I believe little difficulty will be encountered in making the changes."

CHARACTER OF STUDY MADE

The report goes on to say that at the outset of this investigation it was realized that there has been a profound change in the business district of the city. A discussion follows of the growth of the business district to the south, due to the river barrier on the north, and also of the development to the south which followed the construction of the new union station. The latter improvement was followed by the opening of such streets as Broadway, Southwest Boulevard and Main Street, with resulting construction of new business sections.

This movement of the center of the business district has naturally been accompanied by a corresponding change in the course and destination of large numbers of people, the older section of the business district having become devoted almost entirely to wholesale and manufacturing enterprises, so that the contiguous riding has become confined largely to the rush hours. It is pointed out in this connection that street car traffic has fallen off to a point where the service now given is no longer justified.

Another movement which has had a bearing on the desirability of rerouting is the establishment of a number of outside business sections, which have resulted in a considerable amount of community riding with a resultant shifting of the car loading.

A point is made of the fact that no radical changes in the routing have been made, since it is felt that the public objects to such innovations and abrupt changes. The proposed routes differ from the present ones as little as is consistent with obtaining the results sought after. The determination of what changes were desirable was made by a very careful checking of the traffic on all lines and covering all periods of the day at numerous points along each line and in both directions. Observers rode the cars at all periods of the day to determine the character of the territory, the trend of travel, the running time, transferring and other points having a bearing on the subject.

As to the results that will obtain from the rerouting installation, the report states that there will be much better service for the patrons because the lines will be more direct and the schedule speed faster. Routes from the same and adjoining outlying sections have been

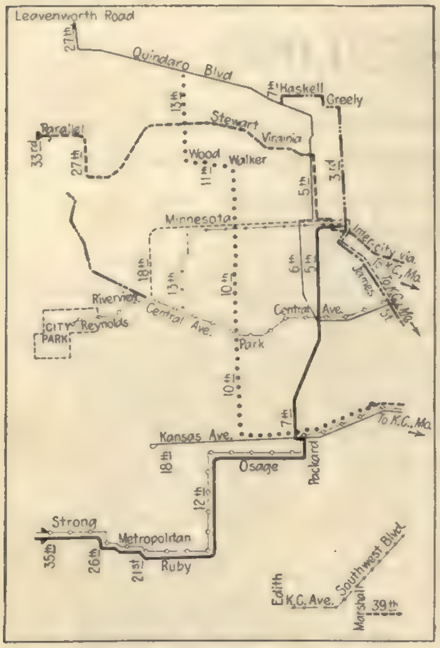
CARS THROUGH PRINCIPAL INTERSECTIONS BETWEEN 5 AND 6 P. M. PRESENT AND PROPOSED ROUTING

	McGee		Grand		Walnut		Main		Delaware		Wyandotte	
Street	Pres.	Prop.	Pres.	Prop.	Pres.	Prop.	Pres.	Prop.	Pres.	Prop.	Pres.	Prop.
5th	..	...	129	47	99	45	37	30*	51	36	95	10
Indep.	.	...	103	65	86	63						
6th	...	...							41	36	109	10
7th			86	49	86	63						
8th	131	118	234	174	234	158					145	88
9th							84	64	84	64	155	72
10th	156	112	190	138	174	98*	127	128			120	52
11th	...	...	...	...	...	...	...	...	...	...	53	35
12th	123	97*	189	205	197	195	164	227			115	128
13th			139	116	129	106						
15th	135	118	184	182	111	134	100*	128				
18th			118	118	89	66	95	110				
19th			119	120	71	60	119	138				
	545	445	1491	1214	1274	988	726	826	176	136	792	395

Total cars through all intersections:

Present	5.004
Proposed	4.004
Per cent decrease	20.0

*Not used as a street car intersection.



THE KANSAS CITY., KAN., FORMER ROUTING

(Note that this map is a continuation to the left of the map below)

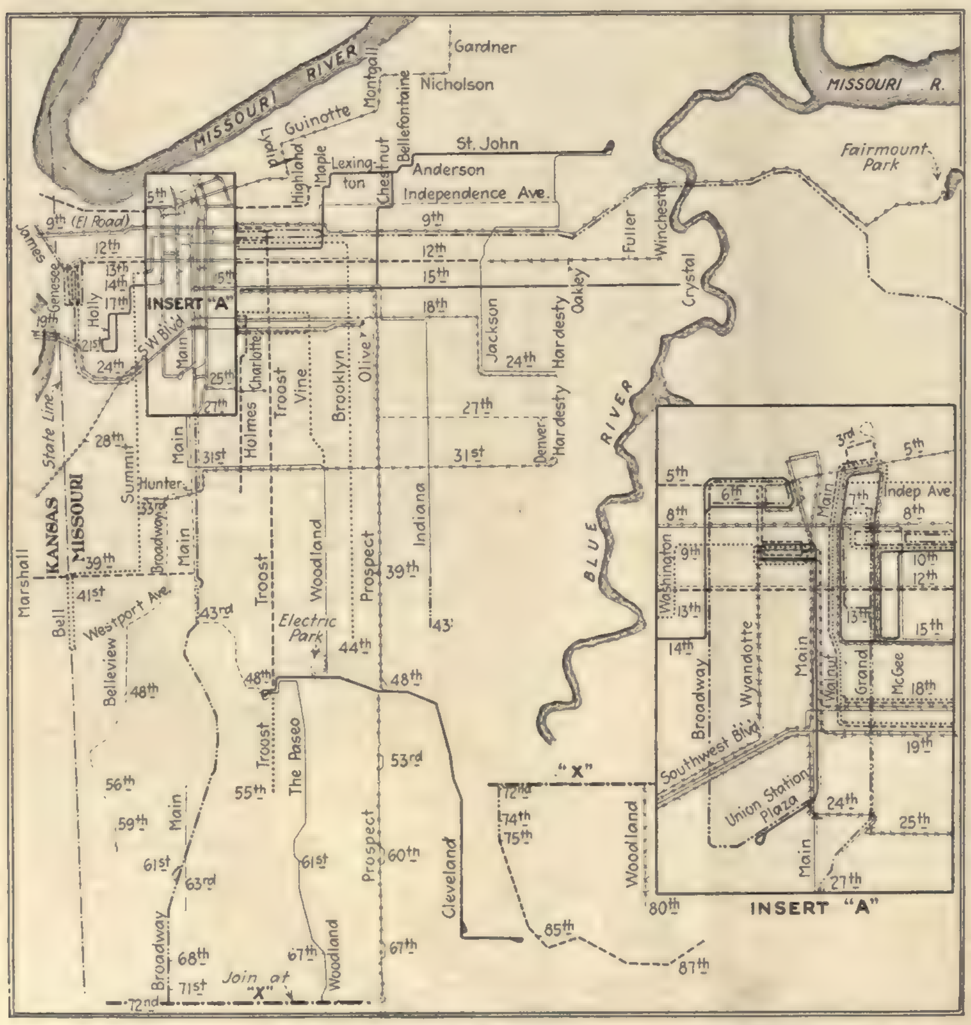
distributed over the principal north and south streets in the business district as evenly as possible. Every effort has been made to keep the street car traffic on the downtown streets balanced. Since many of the routes pass completely across the downtown district, more patrons will be taken to their destinations without transferring. At present about 125,000 people a day are transferred from one line to another, while under the new routing plan this will be reduced to 65,000. The need for multiple transfers will be nearly eliminated except on some suburban lines. The new routes will closely unite all sections of the city and make travel easier.

What is probably the greatest resulting benefit comes from the reduction of congestion in the downtown district. This is well illustrated in the table on page 957, which gives the number of cars per hour at each of the downtown intersections before and after the rerouting change, and by the corresponding pair of car flow diagrams.

SOME OF THE DETAIL CONSIDERATIONS

While it would not be very interesting to one unfamiliar with Kansas City and the present car routes to relate in detail the changes in routing that are recommended, yet it may be worth while to note a few of the explanatory statements as they appear in the report, after a statement of the detail routing, simply to show the line of reasoning.

The Jackson-Roanoke line is a through route, which it is proposed shall be formed by combining the present Jackson and Roanoke lines. The Jackson line as now operated passes through a district along Eighteenth and Nineteenth Streets that has little or nothing in common with the remainder of its territory. It should be run along Jackson Avenue and brought in by way of Twelfth Street. This will give a more direct line and carry the Jackson car through a more productive territory. The Roanoke line now comes in by a circuitous route and is terminated at Tenth and Main, on the edge of the business district. The rerouting will carry it straight across Twelfth Street, through the heart of the downtown business section, so that patrons may transfer from it to practically all lines. Service demands on the two lines are well balanced, so that economical operation will result. On each round trip twelve turns will be saved, and the distance in the congestion will be less. Delays now occurring at Eighteenth and Olive, at Nineteenth and Main and at Tenth and Main will be avoided. In the rush hours a portion of the service should be turned back at Thirty-ninth and Summit and at Twelfth and Jackson. Connecting curves must be installed at Twelfth and Jackson. Fifth Street-Fifteenth Street is another proposed combination of two lines for a through route. By operating the Fifth and Fifteenth Streets lines as a single route by way of Walnut Street in both directions patrons of the East Fifth Street line will be enabled to reach practically the entire business district without the use of a transfer. All trunk lines in the city will



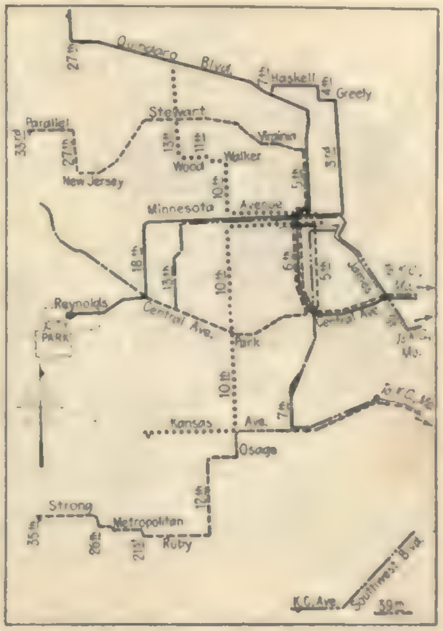
MAP SHOWING FORMER ROUTES FOLLOWED BY VARIOUS LINES IN KANSAS CITY, MO.

be accessible by means of a single transfer. Transferring will thereby be reduced, particularly in the congested district. Four turning movements at downtown intersections will be eliminated, and the distance will be reduced three-fourths mile per round trip. The patrons of the Fifteenth Street line will continue to receive all the privileges heretofore enjoyed. As the proposed route is on the same street in both directions through the congested district, there will also be avoided much confusion heretofore experienced. In addition patrons will be provided with a more direct and rapid route to the industrial plants located in the extreme north end of the city. In the rush hours it will be desirable to turn a portion of the service at Fifteenth and Kensington and Fifth and Grand. Facilities for this purpose are now available.

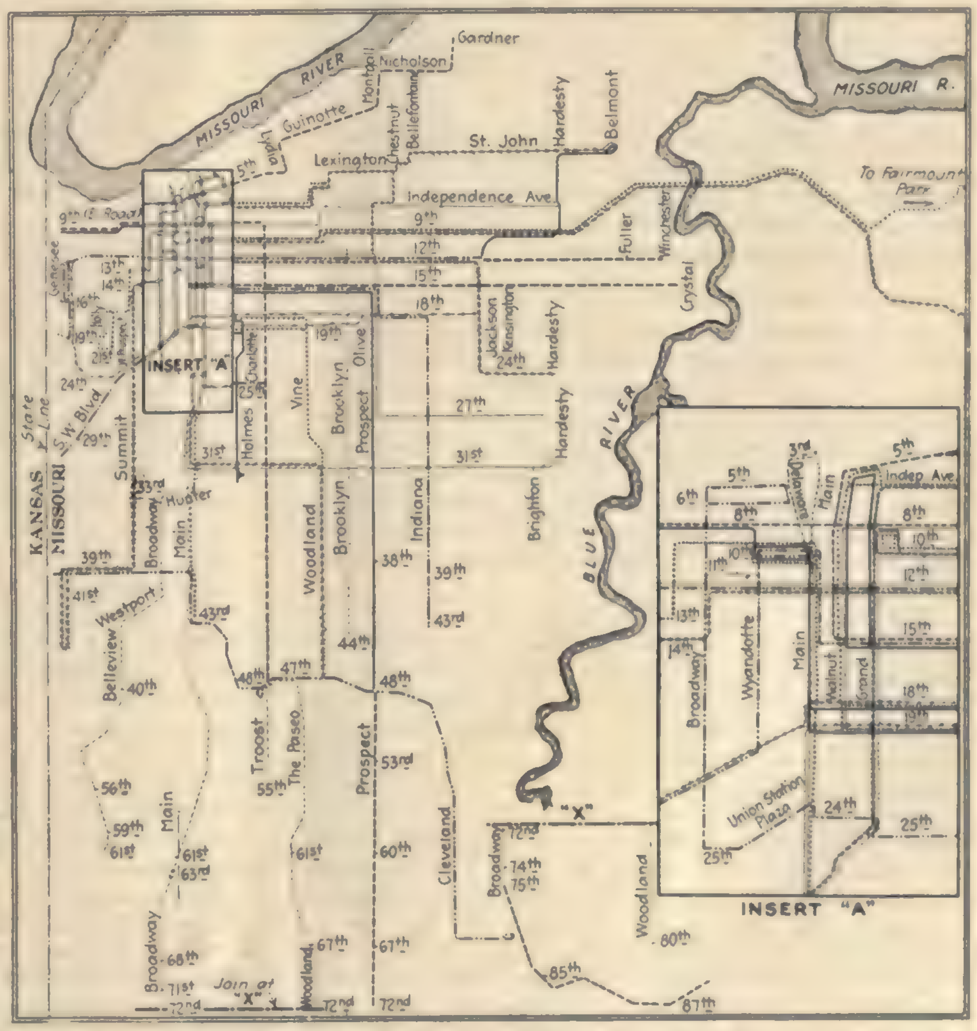
The Eighteenth Street line, which now terminates at Eighteenth and Olive, should be extended to Eighteenth and Jackson to provide crosstown service for an enlarged territory and replace the service now given by the Jackson line. Patrons will be afforded direct service to the industrial plants in the stock yards and warehouse districts and points beyond. Observations show that the riding in this section is now very light. Half of the service should go to Twelfth and Genesee and the other half to Kansas. In this manner the entire business can be better handled.

The Indiana and Rosedale lines are to be through-routed over a stated course. This route is the same as the present Rosedale line as far as Tenth and Wyandotte, at which point it will turn and pass through the part of the business district on Main Street. The Indiana Avenue patrons will be brought in direct on Fifteenth and Main Streets. Both ends of the line will thus have access to the center of downtown activity. This will be a much more independent route than the present Indiana-Quindaro and avoid the delays and curves in the west bottoms and through the Kansas City, Kan., business district and beyond. With the use of safety cars, more frequent service can be given and on account of the reduction of delays more regular headway should be afforded. The track on McGee Street between Tenth and Fifteenth will be uncovered by this change in routing, so that this street will be available for the use of automobiles. A reduction of vehicle congestion in the parallel streets in the business district should result. The Country Club line connects an outlying residential section in the extreme southern portion of the city with the downtown district. To reduce delays and minimize the running time it should be routed as direct as possible. It is therefore proposed to operate this line both north and south over Main Street. This routing will eliminate all turns in the congested district, and delays incurred by turning movements at such heavy traffic intersections as Thirteenth and Grand, Thirteenth and Walnut, Fifth and Grand and Fifth and Walnut cannot occur. It will furthermore provide patrons of this line with direct transportation to and from the Union Station.

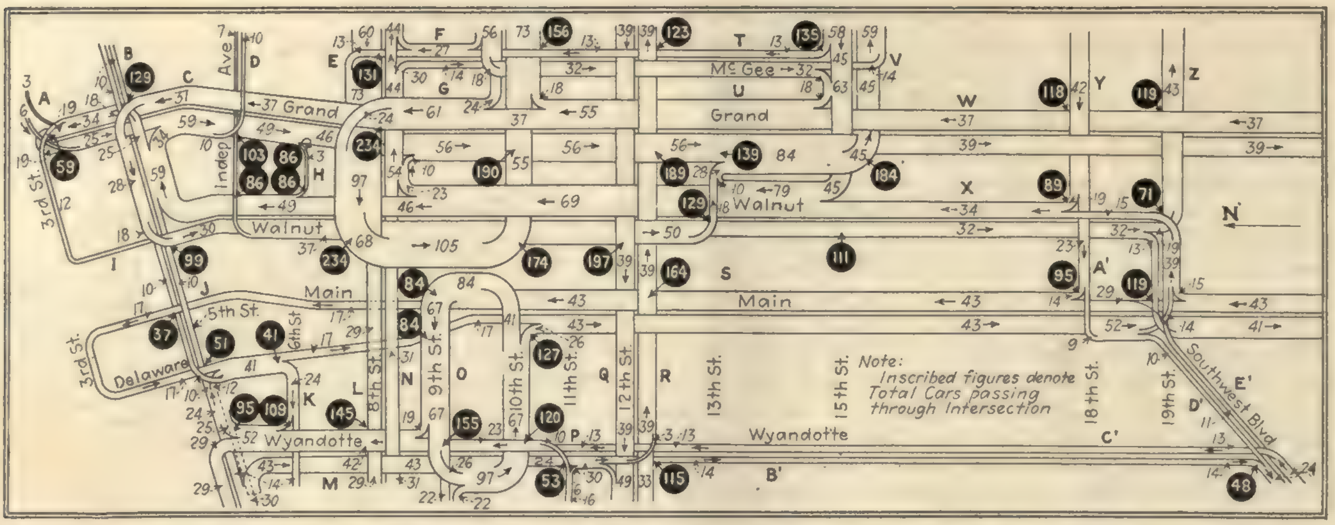
The accompanying maps on pages 958 and 959 show the former routings and those proposed. In so far as



THE NEW ROUTING FOR KANSAS CITY, KAN.
(Note that this map is a continuation to the left of the map below)



MAP SHOWING NEW ROUTING OF CARS ON THE LINES IN KANSAS CITY, MO.



TRAFFIC FLOW IN THE CONGESTED DISTRICT UNDER THE FORMER ROUTING—NOTE SOME OF THE COMPLEXITIES OF THIS ARRANGEMENT

Reference Letter	Name of Line	No. of Cars
A	K. C. C. C. & St. J.	3
	North Kansas City	3
B	Fifth Street	10
C	Sunset Hill	19
	Country Club	18
D	Vine Street	7
	North Kansas City	3
E	Cent.-Fairmount	16
	Troost	31
	Indep.-Rock	13
F	Indep.-Mo.	14
G	Brooklyn	24
H	K. C. C. C. & St. J.	3
I	Holmes	12
J	Woodland	16
	K. C. L. & T.	1
K	5th Street	10
	Observation Park	8
	Broadway-U. S.	6
L	Cent.-Fairmount	16
	Indiana-Quindaro	13
M	Argentine	10
N	Cent.-Fairmount	17
	Indiana-Quindaro	14
O	Roanoke	22
	Jackson	14
	Chelsea	15
	Main St. U. S.	12
	Leavenworth	2
	Kaw Valley	2
P	Argentine	10
Q	12th Street	11
	27th-Minnesota	28
R	12th Street	10
	27th-Minnesota	29
S	Woodland	16
	Main St. U. S.	12
	Jackson	14
	K. C. L. & T.	1
T	Indiana Quindaro	13
U	Northeast	18
	Indiana Quindaro	14
V	Prospect	28
	15th Street	17
W	Sunset Hill	19
	Country Club	18
	Strang	2
X	Indep.-Rockhill	13
	Holmes	12
	Vine Street	7
	Strang	2
Y	Jackson	14
	Holmes	12
	Vine Street	7
	18th Street	9
Z	Jackson	14
	Holmes	12
	Vine Street	7
	18th Street	10
A′	Jackson	14
	18th Street	9
B′	Rosedale	14
C′	Rosedale	13
D′	18th Street	10
E′	(18th Street	9
	(K. C. L. & T.	1

possible, the different routes have been distinguished by characteristic symbolic lines on the maps, but there is no relation between the same symbolic line on a former route and on a proposed route, as so many changes were made as to render this impossible.

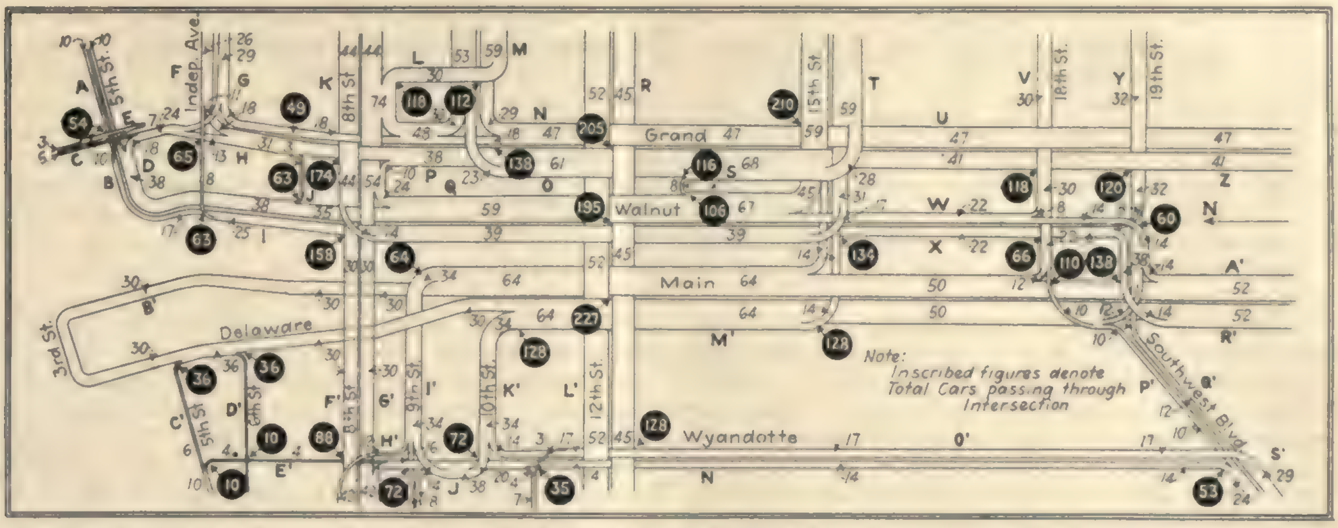
KANSAS CITY, KAN., REROUTING PLAN

Section VIII of Mr. Beeler's report, which covers the rerouting plan for the lines in Kansas City, Kan., states that in the past many complaints have been made by the public that the company was not properly meeting the local traffic requirements. On the other hand, the company has complained that the lines in this city have not been self-sustaining. The survey made has shown that there is justification for both of these claims and that it is plainly evident that the difficulties are caused by the present routings.

The need for rerouting is attributed largely to the fact that Kansas City, Kan., has had a very marked industrial growth during the last fifteen years and now has a population of more than 100,000. The importance of the city as a business center therefore requires the readjustment of the present street car routings, which were laid out primarily as feeder lines to the Missouri system. During the early development of the city residents were largely dependent upon industries located in the bottoms, or east of this district. It is only natural, therefore, that car routes should have been designed to carry the greater proportion of the patrons on through lines to points east of the Kansas River. These conditions, however, have changed to such an extent that the present routings do not serve the community as a whole. The through-riding between the two Kansas Cities is now confined largely to the rush hours, and on many of these through lines the traffic during the day is badly unbalanced and the service is neither required nor justified.

Consequently, with the constantly increasing importance of the city as a residential and industrial community, there has arisen a demand for more service between the business section and the residential districts of Kansas City, Kan., itself. Furthermore, the growth of the city has reached a point where additional railroad facilities are demanded. This has resulted in a proposed union station, to which adequate street car service from all sections of the city must be furnished. Since all lines cannot go directly to every important point in the city, the proposed system of street car routings has been laid out in a way to make the business district of Kansas City, Kan., the hub from which practically all lines will radiate. In other words, in working out the rerouting plan for the two cities, Kansas City, Kan., as well as Kansas City, Mo., has been considered as a separate system and the routing laid out to meet the requirements of traffic in this one city. Then to take care of the large amount of inter city travel the two city systems have been connected by intercity trunk lines so routed as to make direct connections with all of the main distributing lines in each of these cities. This will enable a passenger to go from any point in Kansas City, Kan., to any point in Kansas City, Mo., or vice versa, with not to exceed two transfers, and often only one.

The plan recommended for the Kansas City, Kan., local lines contemplates the establishment of a centrally located sheltered prepayment area through which



TRAFFIC FLOW UNDER NEW ROUTING SCHEME—NOTE DECREASED CONGESTION AT CROSSINGS AND REDUCED NUMBER OF TURNS

Reference Letter	Name of Line	No. of Cars
A	15th & 5th Streets	10
B	15th & 5th Streets	17
C	K. C. C. C. & St. J.	3
	No. Kansas City....	3
D	Prospect Street	10
	Vine Street	8
	K. C. C. C. & St. J.	3
	15th & 5th Streets	17
E	15th & 5th Streets	7
F	Vine Street	8
	Northeast Woodland	18
G	Northeast Woodland .	18
	Vine Street ...	8
	No. K. C.	3
H	Northeast Woodland	18
	Prospect Street .	10
	K. C. C. C. & St. J. .	3
I	15th & 5th Streets	17
	Vine Street .	8
J	K. C. C. C. & St. J. .	3
K	Indep.-31st ..	14
	Troost	30
L	Fairmount Park..	16
	Indep. Mo. .	14
M	Fairmount Park.....	16
	Indep. Mo.	14
	Brooklyn-Sunset Hill..	29
N	Brooklyn-Sunset Hill..	29
	Northeast-Woodland..	18
O	Brooklyn-Sunset Hill.	23
P	Northeast Woodland .	18
	Prospect Street	20
Q	Indep.-31st .	14
	Prospect Street	10
R	12th Street-Argentine..	20
	27th St.-Minnesota....	10
	Jackson-Roanoke .	15
S	Prospect Street....	[illegible]
T	Prospect Street......	28
	15th & 5th Streets...	17
	Indiana-Rosedale .	14
U	Brooklyn-Sunset Hill..	29
	Northeast Woodland..	18
V	Holmes-Quindaro.....	12
	Vine Street	8
	18th Street...........	10
W	Indep.-31st Street......	14
	Vine Street............	8
X	Indep.-31st Street......	14
	Vine Street	8
Y	Holmes-Quindaro.	12
	Vine Street	8
	18th Street	12
Z	Brooklyn-Sunset Hill...	23
	Northeast Woodland...	18
A′	Independence-31st.....	14
	Main St.-Observ. Park..	8
	Country Club	30
B′	Country Club	30
C′	Broadway-25th St	6
D′	Broadway-25th Street	6
E′	Leavenworth.	2
	Kaw Valley	2
F′	Troost	30
G′	Troost	30
H′	Holmes-Quindaro	12
I′	Main St.-Observ. Park	8
	Indiana-Rosedale.	14
	Holmes-Quindaro	12
J′	Leavenworth . ..	2
	Kaw Valley.	2
	Strang Line	2
	K. C. L. & T.	1
K′	Indiana-Rosedale	14
	Main St.-Observ. Park	8
	Holmes-Quindaro	12
L′	12th St.—Argentine	20
	27th St.—Minnesota	10
	Jackson-Roanoke	22
M′	Main St.-Observ. Park	[illegible]
	Holmes-Quindaro	12
	Indiana Rosedale	14
	Country Club	30
N′	Indiana Rosedale	14
O′	Indiana-Rosedale	14
	Strang Line	2
	K. C. L. & T. .	1
P′	18th Street..	10
Q′	18th Street............	12
R′	Indep.-31st Street	14
	Main St. Observ. Park	8
	Country Club.........	30
S′	18th St. .	10
	Indiana-Rosedale	14
	Strang .	2
	K. C. L. & T..........	1

all cars will be passed. Speaking of the advantages of this plan, the report states that it will greatly facilitate car movements, the riding public will be provided with the greatest convenience and safety obtainable, street congestion will be minimized, paper transfers practically eliminated, regularity of service maintained and rapid transit furnished between all points.

Under the new routing plan the citizens of Kansas City, Kan., will not be dependent upon Missouri lines for local transportation, and thus the irregularity of service due to long intercity lines will be eliminated.

All of the lines now entering the business district will continue to do so under the new routing plan, and in addition several other lines will be brought direct to the heart of the city. In order to place the maximum service where it is required and furnish the largest number of cars on that part of the route where riding is heaviest, it is recommended that a portion of the cars on certain lines be turned back before reaching the extreme end of the route. Cars which are to be turned back must always display designation signs plainly, indicating the point at which the trip ends.

[Editors' note: The two sections of the report by John A. Beeler, reported above, are Sections VII and VIII of an extended study in Kansas City. Sections I to V inclusive were reviewed in the JOURNAL, issues of Feb. 14, April 3 and Aug. 14. Section VI was a short report covering rerouting of interurban lines to eliminate them from the congested district.]

Instructive Analysis from Kansas City

Graphic Study of the Five-Year Period Reviewed in the Report of Robert P. Woods, City Member of the Board of Control, Kansas City Railways, Presents Interesting Results

THE final report of Robert P. Woods, city member of the Board of Control, Kansas City Railways, was printed in the JOURNAL on Oct. 9 and in the same issue was given a story of some of the financial events leading up to the recent receivership. The statistics presented in the Woods report seemed to lend themselves to an interesting analysis of certain transportation facts or tendencies on the property, which are presented herewith. Of particular interest is the sharp change in the characteristic or slope of most of the curves for the past year. It is impossible to say with any degree of certainty that this has all been due to the intensive efforts of the company to increase its efficiency, coupled with the work of John A. Beeler, most of whose reports on the Kansas City situation have already been reviewed in the JOURNAL. But doubtless this work has been instrumental in changing the course of events.

With approximately the same population and single-track mileage the railway carried 180,000,000 people in 1920* as compared with 192,000,000 in 1915, while the fare is now 7, 7½ and 8 cents as compared with 5 cents in 1915. For a lower fare in 1919 the railway carried only 160,000,000 passengers. The curve for total passengers carried shows the effect of strikes, fare increases and jitney competition from 1917 to 1919, and it is remarkable that the rapid increase during the past year has been gained with higher fares and the same jitney competition. This increase is probably due to the effect of better service, increased speed and the usual reaction and recovery noticed when fare changes are made.

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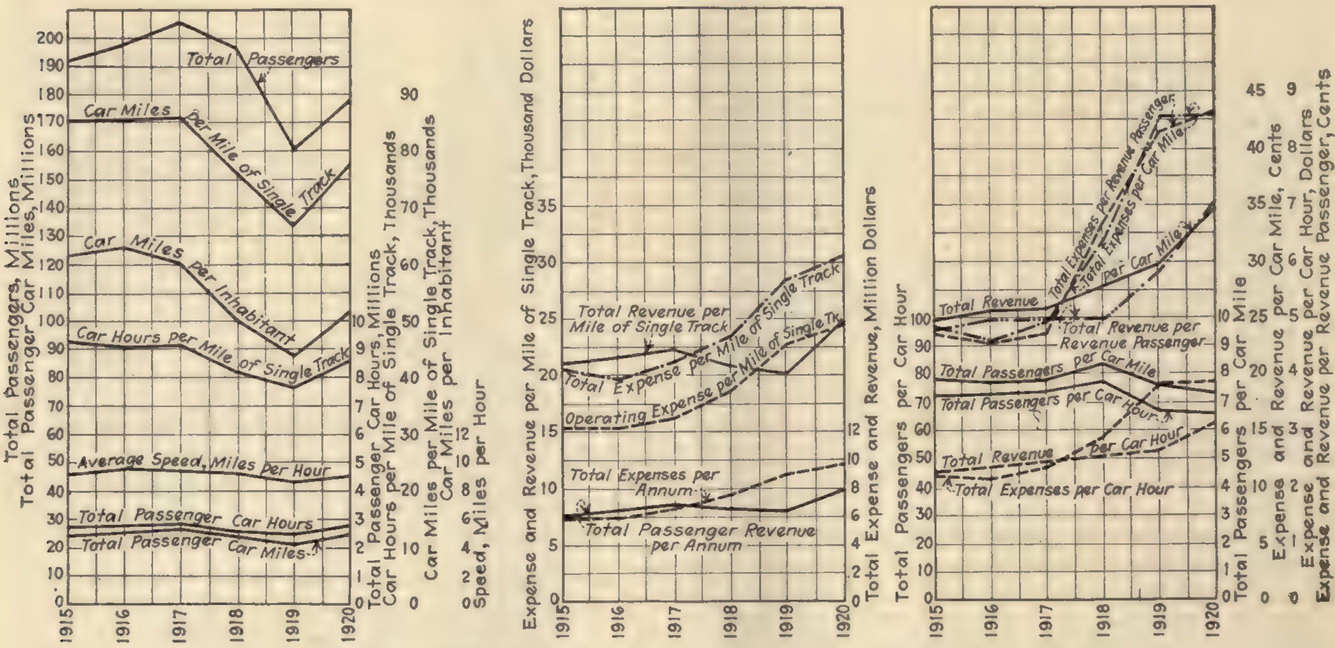
*1920 figures are for the fiscal year ended June 30, and are predicated on eleven months' actual data for the period ended May 31.—EDITORS.

The effect of strikes, increased congestion and jitney competition from 1917 to 1919 is very noticeable from an inspection of the car-miles per mile of single track, car-hours per mile of single track and car-miles per inhabitant, but the hopeful outlook is shown by the marked upward trend evidenced between 1919 and 1920. A criterion of the better operating efficiency now existing is shown by the fact that the car-miles per mile of single track increased 16.4 per cent between 1919 and 1920 as compared with only an 11.4 per cent increase in car-hours and an average speed of 12.3 per cent. At the same time the car-miles per inhabitant for the same period increased 17 per cent, showing that a great deal better service is given. These results were brought about by a revamping of routes, schedules and stops and in spite of the 500 jitneys now competing for traffic. The curves for total passenger car-miles and car-hours show that the 1920 conditions were superior to those of 1915 as regards service rendered.



Data for 1920 Based on Eleven Month Period Ending May 31, 1920

ANALYTICAL CURVES FROM DATA INCLUDED IN THE FINAL REPORT OF ROBERT P. WOODS, FORMERLY CITY MEMBER BOARD OF CONTROL. THESE CURVES SHOW UNIT FIGURES OF INTEREST AND ALSO GENERAL TENDENCIES ON THE PROPERTY

On a unit basis, the curves for total passengers per car-hour and per car-mile show a decrease from 1915 conditions which may be explained by decreased riding brought about by higher fares and jitney and automobile competition and by increased service offered. Although the curves show a downward trend the per cent decrease for 1919 to 1920 is far less than from 1918 to 1919, particularly as regards passengers per car-hour, which again shows the effect of the recent operating changes and improvements.

The data on service and operation show a trend for the better, but the financial data show that relief must be found in some way. When the total revenue per revenue passenger for 1920 was slightly over 7 cents total expenses were 8.6 cents, and operating expenses and taxes alone were 6.96 cents. The total revenue per car-mile between 1915 and 1920 increased 30.2 per cent, while for the same period the total expenses per car-mile increased 77.3 per cent, chiefly due to greater operating expenses, and this difference has spelled financial disaster for the company. The fare increase for the same period has been, on the other hand, only 50 per cent, approximately.

A hopeful outlook and an evidence of operating efficiency are afforded by the curves for expenses and revenue per car-hour from 1919 to 1920. The expenses seem to be at the peak, while the revenues show a decided tendency to increase. The same condition is shown for the same period by the curves giving the expenses and revenue per revenue passenger. The expenses increased only 3.6 per cent as compared to a revenue increase of 20.5 per cent. For the period from 1918 to 1919 the expenses increased at a much greater rate than the revenues per revenue passenger, showing again that the peak has been reached as regards expense increases. The revenue curves have not, however, gained enough to offset the increase in expenses.

On the unit basis of a mile of single track the curves for revenue, operating and total expenses offer food for thought. The expense curves for 1919-1920 show that the increase in total expense is due to an increase in operating expense and that the percentage increase in expenses is far less than the percentage in revenue. The curves showing total revenue and total expenses show the same tendency, but indicate that under existing fare and operating conditions many years will elapse before the revenues exceed the expenses. No company can operate for a long period when on a revenue of $7,800,000 there is an excess of expenses over revenue of $1,800,000.

Situation, from an Economic Viewpoint, of German Tramways[*]

Increasing Wages and Prices, Coupled with Extraordinary Decrease in Value of the Mark, Have Brought on a Real Crisis—By Crowding Passengers and Increasing Fares, This Condition Has Been Partly Met

THE situation of the German tramways is full of interest with reference to the mounting prices of materials and wages and also the increases of fares which have characterized the business of the urban rail transportation systems.

The frightful depreciation of the mark, which has been especially accentuated since 1918, creates a situation which reproduces, but with considerably more seriousness, that which exists in the French and English tramway undertakings. One cannot avoid being interested in the numerous diagrams reproduced herewith, which portray with an eloquence much greater than words the gravity of the situation.

It is easy to understand that it is extremely difficult in these actual circumstances to comprehend clearly the situation and to gain a perspective of the transportation enterprises on account of the following reasons: (1) The uninterrupted and rapid increase of wages on the one part and of the prices of all merchandise and material on the other part makes it difficult to estimate or gain a real comprehension of expenses; (2) the extreme want of materials and the difficulty of finding labor have made it necessary to neglect maintenance; (3) construction materials are in general of much poorer quality than formerly and from this results a reduction in useful life of material; (4) the lack of maintenance perverts results.

It might be said that expenses have often increased in the proportion of 1 to 10, but on the other hand the receipts per car-mile have been equally increased: (1) On account of the increase, quite generally with overloading, and often with very heavy overloading, of passengers, as compared to pre-war conditions; (2) on account of the increase of rates of fare.

Now, the running expenses of a tramway business include:

Wages and salaries.

Running expenses: Pertaining to the permanent way, construction and maintenance; rolling stock, energy.

The increase of the income tax imposed by the state has been in force since July 1, 1919; it is a little different for labor and for managers or other employees, but the difference is inappreciable. The dot and dash line in Fig. 1 illustrates the average increase of wages which has taken place and this shows that at the end of 1919 the expenses under this heading are at least six times as much as they were in 1913. Besides, it must not be lost sight of, in considering salaries and wages, that a new increase has taken place since Jan. 1, 1920.

On this same Fig. 1 there is a curve of the variation of the general cost of living according to official figures. The comparison of this line and that which corresponds to the increase of wages shows that until 1918 the increase of wages was less than that of the cost of living, but that in 1918 the former passed the latter.

As the greater part of the necessaries of life in Germany are imported it is important, in order to understand the real change in costs, to show the curve representing the value of the mark established after communication with foreign money markets was resumed. This curve is shown in Fig. 1 by the dotted line. If everything used were imported, it is evident that the cost of living would be inversely proportional to the value of the mark. But the cost of living is made up of the average cost of imported materials and home products. The fact that its slope, as shown in Fig. 1, is relatively small shows that a large proportion of German products enters into the cost of living. Further, the considerable advances made by the state for the purchase abroad of products necessary to the people has effected a more gradual slope of this curve. The variation of price of supplies of direct concern to the railway business, such as coal and steel and castings, is easy to establish based on official information.

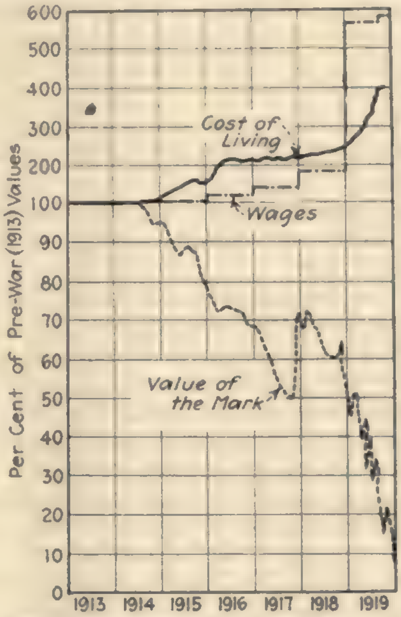


FIG. 1—GRAPHICAL ILLUSTRATION OF THE VARIATION IN COST OF LIVING, WAGES AND THE VALUE OF THE MARK FROM 1913 TO 1919

The first two curves of Fig. 2 give this variation for coal and for rails. For the other materials necessary to construction and to the carrying on of the business it is necessary to depend upon information furnished by the managements of the companies or by the contractors who have handled the construction work.

The other curves of Fig. 2 represent the variations of the cost of copper, electrical equipment and of electrical power, a price intimately connected with that of coal. The price of copper trebled during the war and remained stationary until the middle of 1919, since which the increase in the price has been very great until it finally attained in the beginning of 1920 sixteen times the pre-war figure. Expenses connected with electrical material and machinery in general have approximately followed the same law of variation. The price of trucks and motors, for example, has become 12.5 times as great

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[*] Abstracted from *L'Industrie des Tramways et Chemins de Fer*, which in turn takes its information from *Verkehrstechnik*, the original article being over the signature of Professor Helm, Eng. D., of Berlin.

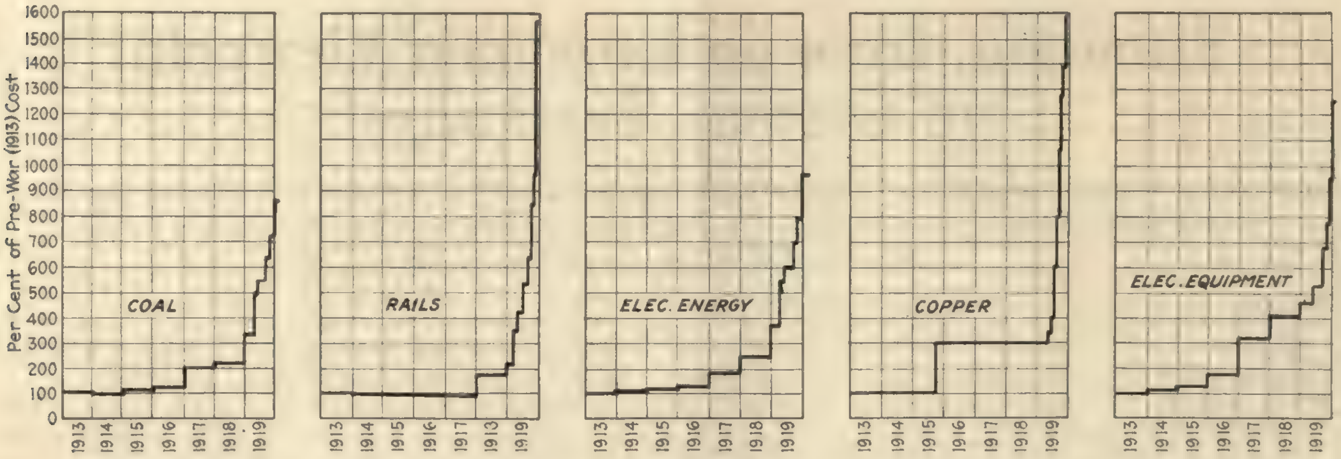


FIG. 2—CURVES SHOWING, IN PERCENTAGE OF COST IN MARKS, THE INCREASES IN COST OF VARIOUS ESSENTIALS TO TRAMWAY OPERATION

as previous prices, those of electrical equipment fourteen times greater, figured on the basis of Jan. 1, 1920.

In Fig. 3 there is represented the curve of variation of the combination of all expenses (wages, expenses of maintenance, replacements and new installations, and price of electrical energy).

The total expenses thus analyzed attain 9.15 times the pre-war figure and it is predicted that they will become twelve times that figure by the end of 1920.

In the evaluation of receipts it is necessary to add to the increase of fares the better or greater utilization of available cars as stated above.

Fig. 4 shows a curve representing the increase in receipts due to a better utilization of rolling stock, this factor alone causing receipts about 2.1 times as great as pre-war figures. With the majority of the companies, this increase has already assumed such proportions that present conditions indicate an overloading which cannot be exceeded.

It was during the year 1917-18 that this increase was the greatest; it is still noticeable in 1919, but it does not seem possible to hope for new increases in receipts from this source. With reference to increases of fares, the Association of Tramways and Suburban Railways has established a municipal bureau which has made it possible to construct the curve in Fig. 5, indicating the average increase of fare modified in several cases to take into account the length of ride. In October, 1919 the mean fare was 2.1 times the pre-war fare; the calculation along this line for the first part of 1920 is not yet finished. One can safely predict, however, that the new tariff will be 2.5 times as much, in round figures, as that in 1916. For the purpose of comparison there is represented on the same figure the curves of variation of the fares for the passenger service of the Prussian state railways.

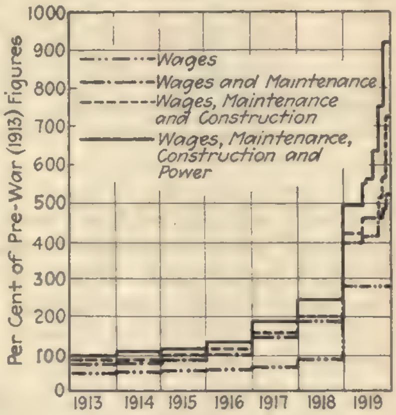


FIG. 3—COMBINED CURVES SHOWING TOTALIZED EFFECT OF VARIOUS INCREASES

The increase in total receipts is then 210 per cent on account of the better utilization of rolling stock available and 250 per cent on account of the increase in fares, making altogether 525 per cent above the pre-war figures.

From this it results. after being compared with expenses, at the end of 1919, that the fare should be 1.7 times the pre-war figure, and if one takes into account the expenses in the early part of 1920, 2.3 times those existing at the end of December, 1919.

If one would compare the increase to the pre-war base, fares should be multiplied by 2.5 times 1.7 (that is, should be raised in the proportion of 240 per cent) or even by 2.5 x 2.3 equals 575 per cent.

As a result of this, in tramway undertakings which charged in 1913 a fare based on 10 pfennigs, the fare ought to be 44 pfennigs, by the end of 1919, and 10 x 5.75 at the beginning of 1920, or 57.5 pfennigs.

Now, the fare currently in vogue is, for the year 1920, only 25 pfennigs; and the figure 40 pfennigs, adopted by some of the companies, is still much inferior to the 60 pfennigs established after the consideration given herewith.

The question now confronting the companies is to know how the tramway enterprises can arrive at any balance in their budgets in the presence of such great discrepancies between receipts and expenses. One must not lose sight of the two facts which were outlined above, namely:

On the one hand, the better utilization of available rolling stock, of which the influence has been very noticeable on the receipts up to recent months, has contributed much to re-establish the equilibrium, but this factor appears to have reached its maximum effect.

On the other hand, under the condition of the scarcity of labor and the lack of raw materials, maintenance has been neglected; this evidently does not constitute a real economy, but on the contrary, the corresponding expenses will have their effect upon subsequent budgets, and will be found then, in all probability, to be much increased.

In the annual statistics of industries and commerce in Germany the local railways and tramways show the least net profit. It is true that the profits of the tramways are not separated from those of the local railways. The figures in the table on page 965 give by themselves, however, an approximate idea of the proceeds or profits of the tramways from 1907 to 1915.

The economic crisis through which these companies are going is due chiefly to the opposition met at the hands of the authorities of the communities which are against raising the fare; however, that increase is necessary, not only on account of the interests of the companies themselves and of their stockholders but especially in the interests of the public, and the increase should be such as to permit these companies to meet the increase in expenses. During the war, and especially since the various communities have been laying plans to take over the private enterprises, a balanced budget has never been possible to realize.

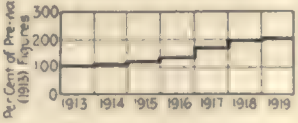


FIG. 4. INCREASE IN RECEIPTS DUE TO BETTER UTILIZATION OF FACILITIES

Such are the explanations that it is possible to give to the critical financial situation of the tramway business. It is impossible to foresee the time when the equilibrium can be re-established with the continual aggravation at the increases of prices for all sorts of goods.

DATA ON DIVIDENDS OF GERMAN TRAMWAYS AND LOCAL RAILWAYS. FIGURES INDICATE IN PERCENTAGE THE NUMBER OF COMPANIES GIVING DIVIDENDS IN THE VARIOUS CLASSIFICATIONS LISTED

	1907–08	1908–09	1909–10	1910–11	1911–12	1912–13	1913 14	1914–15
No dividends	21 30	19 83	18 30	17 78	17 71	15 34	18.15	27.96
Dividends less than 6 per cent	47 60	51 26	49 41	46 56	46 36	52 46	49.58	55.68
Dividends from 6 per cent to 10 per cent	29 90	80 07	31 59	34.70	34 66	30 96	31 87	16 26
Dividends greater than 10 per cent	1 20	0 84	0.77	0.96	1.27	1.24	0 40	0.10

The important differences evident in the fare increases of the various companies (which all had as a base the fare of 10 pfennigs before the war) show that quite frequently certain businesses do not take into consideration the critical situation in which they find themselves from the financial point of view. It is possible to conclude from this analysis that the economic situation of the tramway businesses mentioned is extremely critical. With regard to wages actually paid and to the increase of expenses of all sorts, it will be necessary to multiply by six the pre-war fares and to double, at least, those in force at the end of 1919, and it is to be feared that other increases will be unavoidable in the near future. The figures and table given above must call forth interesting comments.

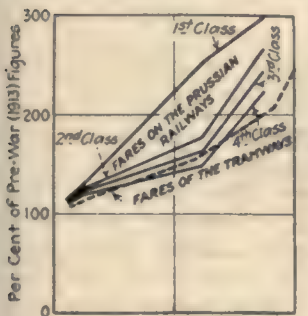


FIG. 5. AVERAGE INCREASE IN FARES ON TRAMWAYS AND RAILROADS

According to statements made by railway officials in Switzerland, their government contemplates spending a total of 52,000,000 francs on railway electrification. Up to Oct. 1 of this year the sum of 600,000 francs had been spent on this work and by 1922 they look forward to a complete electrification of all the main lines that run through tunnels and passes.

Australian Railway Experiences

P. J. Pringle of Ballarat, Victoria, Australia, Says That One-Man Cars Bring Good Results in His Country

THAT America is not alone in facing railway problems was made clear by P. J. Pringle, chief engineer and general manager the Electric Supply Company, Ballarat, Australia, in a recent paper read before the Tramways & Light Railways Association of Great Britain.

The Australian railway, he said, had reached a critical financial condition which could be met by: (1) Putting the loss on the shareholders; (2) raising the fares, or (3) reducing costs of operation. He stated that his company, which operates in Ballarat and Bendigo, Victoria, introduced one-man cars in May, 1913, on eight and one-half routes out of eleven, with the result that in many cases the company effected a 50 per cent saving in operating costs and about the same saving in platform costs. The one-man cars were used on approximately the same average schedule speed, or 8 m.p.h.

The one-man cars are all single deck with a fare box in the front entrance. There are hinged notice plates just above the dash, one side notifying "Pay as you enter," the other side "Pay as you leave." Cars traveling from suburbs to congested districts display the former, while cars loading in the congested districts display the latter.

The accidents were reduced to one-eighth of their previous value due to the use of the one-man cars. The trolleymen gave little trouble because of the use of one-man cars after the first few days and now press to take a one-man car route in order to get the extra dollar a week.

Mr. Pringle states that the coning of rail and wheel treads creates corrugation and increases rail wear, and that the subject is worthy of careful investigation, particularly as many object strongly to the proposed new standard increasing the present 1 to 20 coning. He suggests that a standards committee should investigate the extent of side swaying of cars on systems with heavily and lightly coned treads as compared with those using flat treads; that meter readings be taken in the foregoing tests and that, if any system is operating with flat rail tread and wheel tread originally, the resultant coning of the rails be carefully examined. The slipping effect on straight tracks may cause corrugation troubles and the coned wheel and inclined rail head surface, together with the large diameter wheel fillets, may intensify the effect. He stated that corrugations on the Melbourne Cable Tramways are non-existent on routes over which single-track cars operate, and that the coning on the Edinburgh Cable Tramways is eight times that of the Melbourne Cable Tramways with a greater annual rate of wear and a life loss of 23 per cent as against 6.2 per cent.

A national uniform wage system has been advocated for Australian railways, said Mr. Pringle, but he considers such a system ill advised. Scales of living and costs of living differ in city and country districts and the differential systems based on each local situation he believes to be the only just wage system.

The authorities in Australia have recognized the importance of depreciation and now grant 10 per cent for power station plant and 5 per cent for tramcars.

Rapid Transit Station Design

Relation of Platform, Entrance and Exit Arrangement to Passenger Interchange, with Appropriate Examples from Typical Subway and Elevated Stations for Rapid Transit Lines

IN THE issues of *Engineering News-Record* for Oct. 28 and Nov. 4 Olof A. Nilsson, designer, Transit Commission of New York City, gives a comprehensive analysis of the problems connected with the design of stations for rapid transit lines and illustrates present practice by means of appropriate examples. Some of the points made by Mr. Nilsson are outlined in the following paragraphs:

Two factors determine the passenger capacity of a railroad, the capacity of each train and the minimum headway on which it is possible to operate trains. The former, of course, depends on the capacity of each car and the number of cars in the train. The minimum operating headway is determined by one of two independent factors, the safe minimum distance between trains running at a certain speed between stations, "the running headway," and the time required by the train to pass through a station block, "the station headway." The station headway, again, is primarily determined by the length of the train stop at the station. As ordinarily constructed the stations are the points of slow train movement, and, in general, the station headway governs, and the minimum operating headway is fixed by the maximum station headway on the line.

When a station is planned the starting point should be the ultimate carrying capacity of the line and the ultimate traffic yield of the district tributary to the station. From these factors and from the general scheme of operation the size and capacity of the cars and the number of cars to the train, the train lengths and train capacity, are determined. The train length is the basis for the platform length, while the width of the platforms, the width and capacity of stairways and passages, etc., are fixed with reference to the anticipated maximum traffic flow through the station. This is seldom a simple problem.

Classified on the basis of platform type, all stations are of either the side-platform type, the island-platform type, or a combination of both. With reference to location relative to the line, stations may be classified as:

(a) Terminal stations, which may be either the loop-end type (Hudson & Manhattan downtown terminal in New York) or the dead-end type (Brooklyn Bridge terminal New York).

(b) Intermediate stations.

(c) Stations at junction points, where two or more lines meet, or where one main line divides into branches.

(d) Stations at crossing points, where two or more lines cross, either with or without track connections.

In planning entrance and exit stairways it makes a difference whether the station is elevated or underground. In crowds more people go up a stairway than down in a given period. A convenient and safe rule in figuring the capacity of a stairway is to allow for each lineal foot in width 1,000 people per hour for downward and 1,100 for upward movement when the movement is all in one direction. The capacities of unobstructed ramps and passages may be assumed as 2,000 per lin.ft. in width per hour. For an average walking speed of 5 ft. per second this allows 9 sq.ft. of floor space to each person. Where people move simultaneously in opposite directions under crowded conditions the capacity is less. No stairway planned for simultaneous movement in both directions should be less than 5 ft. wide. Sharp turns also seriously retard the movement and should be avoided wherever possible. The maximum grade for a ramp should be 11 per cent; 8 to 10 per cent is better. For stairways the pitch adopted in the New York subways—7 in. rise and 11 in. tread—is good; when conditions permit, it is desirable to reduce the height of the riser and correspondingly increase the width of the tread according to the rule that two times the height plus the width (both in inches) should equal twenty-five.

On a loading platform passengers waiting for a train naturally group themselves along the platform edge. Sufficient width should be allowed for these waiting passengers to permit a certain freedom of movement and to give unobstructed passage to incoming passengers. Moreover, behind these groups there should be enough width to permit people to move about between different parts of the platform and the platform stairways. Each station is an individual problem and no definite rule for platform width can be given, except the general statement that the more the conflicting passenger streams are separated into definite channels and the quicker the platform is cleared the better will be the result.

SOME EXAMPLES OF SUBWAY AND ELEVATED STATIONS ARE CITED

In the Paris rapid transit system the lines all have loop ends, permitting the trains to run continuously back and forth and around the loops without the use of switches and crossovers. For the most part these lines are built underground with stations as close to the surface as the method of construction and the topographic conditions allow. The standard platform length is 246 ft. and the width (of side platforms) about 13.5 ft. Intermediate stations are generally of the side-platform type, while most of the end stations have island platforms. The latter have also, in general, separate stopping places for loading and unloading, so that incoming and outgoing passengers are kept separate from train to street.

On one of the additions to the rapid-transit system of Berlin, the Schöneberg subway, a two-track line which was opened for traffic in December, 1910, the stations, of the island-platform type, have platforms 25 ft. wide and entrances at the ends through stairways 13 ft. wide to the middle part of the street. They were planned to be built in two stages, the first part of it only was designed to be completed at the opening of traffic, the second part to be added when necessitated by the growth of traffic. The first part of the station, with a platform length of 148 ft., accommodates a train of three cars; the completed station has a platform 312 ft. long and accommodates a seven-car train. The middle part of the platform is occupied by various stands and enclosures for station attendants, newspapers, etc.

In Boston the busiest station on the subway system is the Park Street underground station at the intersection of the Tremont Street subway and the Cambridge-Dorchester tunnel. Here the lower level station, for Cambridge-Dorchester trains, is 350 ft. long and has two side platforms for unloading and one island platform for loading. The former are 10 to 12 ft. wide, the width of the latter varies from 18 to 30 ft., tapering from the center toward the ends. The upper level—for the Tremont Street surface cars—has two island platforms. Each track has berths for eight cars along the straight portion of the platform. The east platform (exclusive of stairways) contains about 9,625 sq.ft. and the westerly one about 14,050 sq.ft. The entrance and exit stairways from the upper level to the surface are through structures on the Boston Common. The southerly entrance on the easterly platform has an intermediate lobby or mezzanine above the platform for the control; on the other entrances the control is on the platform. The lower level has an entrance lobby at its easterly end just east of the Park Street structure with stairways to the street and from the unloading platforms, ticket control and a wide stairway to the loading platform. From both unloading platforms there are escalators to the street surface. For direct transfer between the two stations there are six stairways, one from each platform on the lower level to each one on the upper.

An extensive rapid transit system including both subways and elevated roads has been planned and is being built in Philadelphia and the stations on this system are good examples of modern, well planned, rapid transit stations. In the Girard Avenue express station on the Broad Street subway the platform length is 550 ft., the width at the center 20 ft. 9 in., tapering toward the ends through a large radius curve on the outside platform edge. The platforms are accessible from the street through a mezzanine under Girard Avenue which has eight stairways from the street and three to each platform. In addition there are stairways for exit only, near the ends of both platforms.

A local side-platform station on the same line at Ridge Avenue has a similar arrangement with entrances and exits at the center and additional exits near the ends. The platforms, 12 ft. wide except at the ends, where the width is 10 ft., are unobstructed through their entire length, platform columns being eliminated and the stairways being built in recesses outside of the walls of the main structure. Another local station at Twelfth and Arch Streets on the "delivery loop subway" has entrances at or near the ends with additional exits at the center.

The Brooklyn Bridge station of the first subway in New York, opened for traffic in 1904, was built for eight-car express trains with platforms about 350 ft. long. The width of the express platform at the center is 20 ft., narrowing toward the ends. The stairways from the platforms are 8 ft. wide and the mezzanine platform or bridge spanning the tracks is 20 ft. wide. The two side platforms of the station have never been used. When the rapidly growing traffic made the train service originally adopted insufficient, the express platforms were lengthened to 480 ft. and ten-car express trains put in service. A ten-car train is 520 ft. long, so that the end doors of the first and last cars do not come within the platforms and are not used.

The Chambers Street station of the Seventh Avenue subway, opened in 1918, is located not far from the Brooklyn Bridge station and invites a comparison with the latter. The platforms are 18.5 ft. wide and 485 ft. long. Instead of a narrow bridge spanning the tracks there is a large mezzanine floor under the intersection of Greenwich and Chambers Streets with stairways to the four street corners. From each platform there are four stairways to the mezzanine. Should additional stairways and mezzanine area be required the mezzanine can be extended over the platform in both directions.

A station that by virtue of its location is destined to have a very heavy traffic is the Grand Central station of the Park Avenue-Lexington Avenue subway, opened for traffic in August, 1918. It is located diagonally across Forty-second Street between Park and Lexington Avenues, and is adjacent to and by means of underground passages connected with the New York terminus of the New York Central and the New York, New Haven & Hartford railroad systems and the Grand Central Terminal. Directly below the station and connected to it by means of a ramp, a stairway and three elevators is the Grand Central station of the Queensborough subway, which here runs under Forty-second Street. There is also a shuttle service under Forty-second Street from this station west to the Times Square station on the Seventh Avenue line. It is evident that in addition to the traffic originating in the neighborhood, rapidly being built up with large office structures and hotels, an unusually large transfer traffic will result from the meeting and intersection of these traffic lines. The station is of the ordinary type for four-track express stations with two island platforms of varying width about 485 ft. long. Each platform has, in addition to two stairways leading down to the passageway and ramp communicating with the Queensborough station below, six stairways leading to two mezzanine floors above the platform. From these mezzanine floors there are numerous passages and stairways leading through adjacent buildings to the street level and opening on Forty-second Street, on Park and Lexington Avenues and as far north as Forty-fifth Street. A short ramp connects the larger of the two mezzanine floors with an island platform serving the shuttle trains to the Times Square station.

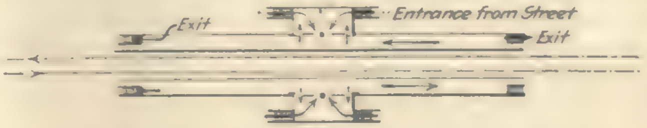


FIG. 1

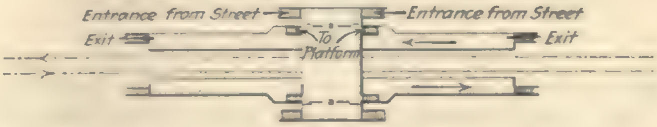


FIG. 2

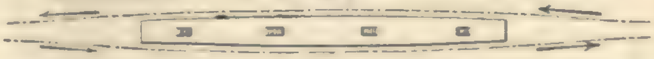


FIG. 3

FIG. 1—SIDE-PLATFORM STATION. FIG. 2—SIDE-PLATFORM STATION WITH MEZZANINE. FIG. 3—ISLAND PLATFORM STATION

The problem of locating entrances and exits is frequently a difficult one for the station designer. On a busy street the presence of an elevated stairway or a subway kiosk on the sidewalk is, as has been demonstrated in New York, a serious impediment to the movements of pedestrians. On the other hand a subway or elevated entrance located entirely inside the building lines of an adjacent business building not only has the virtue of not being a sidewalk encroachment but is also an actual asset to the owners of the building, increasing in value as the traffic increases. This has also been demonstrated in New York, where property owners in general are alive to the advantage of having a subway entrance on the premises, and are quite willing to grant the space for and pay the cost of an entrance without any other compensation than the resulting increment in rental value.

In the building of the Frankford elevated railroad it was aimed to avoid placing the station stairs on the sidewalks. At all stations on this line a building containing stairways, control, toilets and waiting room has been built within the building lines on property taken for the purpose under condemnation proceedings. At the platform level there is a bridge from the station building to the platform. Such a station is located at Ruan and Church Streets. It is a rectangular building and control may be at either the street level or at the platform level.

Electrification of Railways in Great Britain

Advisory Committee Presents "Interim Report" Favoring 1,500 Volts, Direct Current, for Contact System and 50 Cycles for Transmission

THE committee appointed by the Minister of Transport of Great Britain to inquire into the electrification of railways has presented an interim report, covering the progress made as a result of twenty-eight sittings held beginning on March 22. This committee comprises Sir Alexander Kennedy, chairman; S. G. Redman, secretary, and Sir John A. F. Aspinall, A. R. Cooper, Sir Philip Dawson, Sir Alexander Gibb, Charles H. Merz, Sir Philip Nash, Lightly Simpson, Roger T. Smith, Sir John Snell and Sir Henry Thornton.

This committee was asked to consider (1) whether any regulation should be made for the purpose of insuring that the future electrification of railways in the country be carried out to the best advantage in regard to the interchange of electric locomotives and rolling stock, uniformity of equipment, etc.; (2) if any such regulations are desirable, what matters should be dealt with and what regulations should be made, and (3) how far it is desirable, if at all, that railways or sections of railways already electrified should be altered so that they may form parts of a unified system.

The committee reported that evidence had been taken from witnesses representing a number of railways and that Ivan Ofverholm, chief electrical engineer Swedish State Railways, and Col. Huber-Stockar, consulting engineer Swiss Federal Railways, had come to England to give the committee the benefit of their advice.

The principal points raised in the report are covered in the following paragraphs:

It is considered that in order to insure that the future electrification of the railways shall be carried out to the best advantage, it is desirable that certain general regulations should be made for observance by the railway companies when electrifying their lines. These regulations should be directed especially to insuring standardization of those methods and appliances which are likely to prove most satisfactory under British conditions. They should put no avoidable difficulties in the way of the adoption in future of any improvements in methods or appliances which may from time to time become available with increasing knowledge and experience.

The committee recommended that regulations be issued to the effect that in the cases of those railways which have not as yet electrified any lines, as well as those which at present have electrified all or part of their lines on a direct-current system, electrification or extended electrification, as the case may be, should be carried out on the direct-current system.

It is further recommended that the standard pressure of the direct-current system at the substation busbars should be 1,500 volts, subject to the continuance of any existing 600-volt or 1,200-volt installation; also that half the standard voltage be adopted, where advantages would arise from the use of this lower pressure, and that higher pressures be adopted, limited to multiples of the standard pressure, where it can be shown to the satisfaction of the minister that sufficient advantage would accrue.

It is still further recommended that both overhead and rail conductor collection should be permitted, the position and general design of the conductors and structures to be in accordance with recommendations to be made later. In a subsequent report the committee will also suggest the requirement that locomotives or motor coaches be able, where necessary, to run at two different voltages and with either rail or overhead collection.

It is recommended also that the generation of current for direct current lines should be alternating, three-phase, at such voltage as may be desirable in each case; also that in the case of existing generating stations supplying at any frequency between 25 and 50 cycles it is unnecessary to make any change in frequency, but that it is desirable that where any one such frequency is in general use in a particular electricity district, any new power station put down in that district for supplying a railway should adopt the frequency which has been approved by the electricity commissioners or is in general use in that district. The committee states that, from evidence which has been put before it, as well as from the experience of its members, a desirable frequency is 50 cycles.

The committee excepts from its recommendations the electrified portion of the London, Brighton & South Coast Railway system which long ago adopted single-phase current for its suburban lines, and did so with a special view to the adoption of a system which at that time appeared the only one admitting of extension from London to Brighton, when this extension became feasible. The general manager of the company, Sir William Forbes, came before the committee to say that his company considers the extension to be now not only feasible, but urgently desirable. In view of the circumstances, the committee recommends that the electrical system of working at present in use, or actually under construction, on the Brighton company's suburban lines need not be changed and that in view of the recent proposals of the government as to the grouping of railway companies the question of the system on which the proposed extension of this railway line to the coast should be carried out is one for special consideration from the point of view of the requirements of through working and interchangeability of traffic with the other systems forming part of the proposed Southern group. Subject to these matters receiving the fullest consideration, and provided the completion of the proposed extension on the present system shows a substantial financial advantage, the committee is of the opinion that it should be allowed.

Three Fundamentals Govern at Richmond

IN A recent communication to the editors of ELECTRIC RAILWAY JOURNAL, Thomas S. Wheelwright, president Virginia Railway & Power Company, Richmond, Va., made the following comment on the general traction situation, which is worth special note:

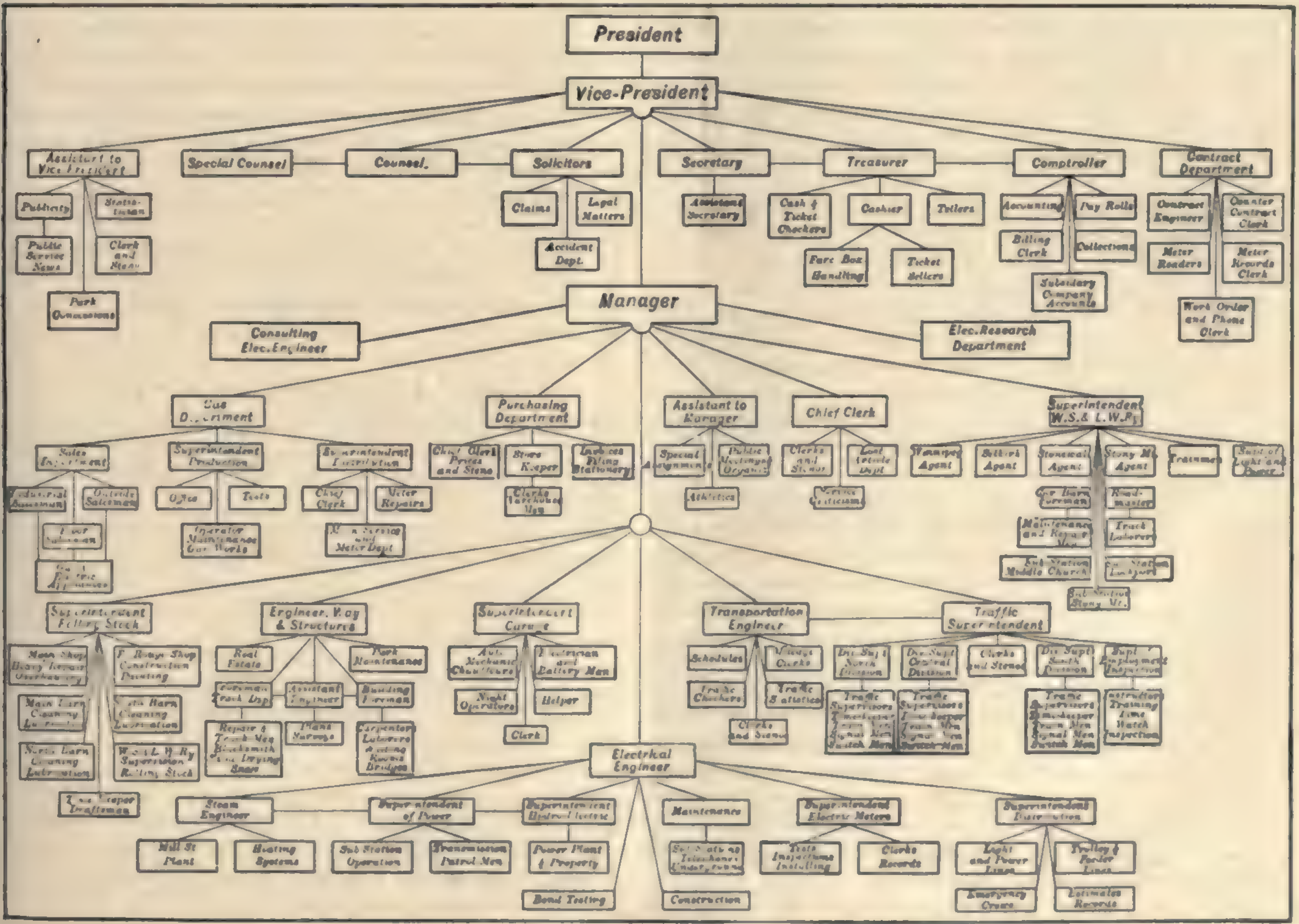
"I am firmly convinced that in order for the utility business to re-establish its much-needed credit it must first prove its willingness and ability to adhere to a few fundamental principles: First, it must establish its relations with its employees on the basis of the open shop, which I believe to be a concrete application of American independence. Of course, the rates of wages must be fair and equitable, and in this connection I firmly believe in the principle of profit sharing which we have put into effect. Second, that the old contractual relations with the municipalities which were initiated and have been continued on a 'jockeying' basis will have to be wiped out and replaced by contracts guaranteeing a just and inviting return on the fair value of the properties. Third, that the equipment or machines by which the public is served must be improved and made to conform to present-day conditions, especially by the wider adoption of the safety car and the use of trackless trolleys in the smooth-paved districts, with a view to the latter vehicle gradually replacing the present trolley as the streets are smooth-paved.

"With these principles in mind and persistently adhered to, I do not believe it is too much to hope or expect that the trolley business in the next generation will be an even greater factor in community growth than it has been in the past."

Staff Organization of Winnipeg Electric Railway

THE Winnipeg Electric Railway staff has recently been considerably reorganized, some of the changes being mentioned in the issue of this paper for Aug. 28, page 441.

As stated in that article, the managerial work has been turned over to Frank L. Butler, formerly general superintendent, who reports to A. W. McLimont, vice-president. The accompanying organization chart shows the way in which responsibility focuses in the several departments, and the chart also constitutes a general bird's-eye picture of the railway system as a whole. It comprises about 112 miles of track and 325 or more cars and seven buses are used. A large lighting and power business is conducted.



NEW ORGANIZATION CHART FOR WINNIPEG ELECTRIC RAILWAY

Electrification Situation Summarized

At Joint A. S. M. E. and A. I. E. E. Section Meeting Held in New York City George Gibbs Presented a Comprehensive Picture of the Problem

IN THE issues of this paper for Oct. 23 and 30 the proceedings of a joint meeting of mechanical and electrical engineers held in New York City on Oct. 22 were covered in some detail. Space limitations last week precluded the inclusion in extenso of the closing remarks or summary of George Gibbs, chief engineer electric traction Long Island Railroad, but a longer abstract was promised. This follows:

Mr. Gibbs considered first the two types of power plant that are available for transportation work, the portable and the stationary. In steam service the plant is a part of the moving train; in electric it has both stationary and moving elements, *viz.*, a central power-generating plant, various connecting links to bring the power to the train and means of utilizing it there.

As regards simplicity, therefore, the self-contained steam locomotive has an inherent advantage over the combination of elements required for electric propulsion, and the latter must show some peculiar advantages in an operating rather than a structural sense if it is to supersede steam traction. Furthermore, the steam locomotive has been developed to a perfection of detail and a high degree of steam economy during the one hundred years of its use; it does wonderful work, and is in possession of the field, representing a heavy money investment, and can, therefore, be displaced (even by something better) only by slow degrees. Railway men can hence discuss this new rival of the steam locomotive with calmness and should co-operate with their enthusiastic electrical friends in giving their suggestions a trial. One never can tell what good may develop out of a thing, especially when he does not fully understand its possibilities.

STEAM AND ELECTRICAL MEN MUST GET TOGETHER

Mr. Gibbs said that he spoke as a steam railway man and confessed to a "sneaking" fondness for the reliable old "iron horse." He was, however, sufficiently "in" with the new order of things to warrant him in speaking plainly to the electrical men and suggesting to them due modesty in making their claims. Co-operation of both sides must be had in the development of a useful new traction means. This is especially desirable now, as the paramount necessity of the country is more and better transportation. If it can be furnished through electric traction, in particular cases as a starter, this should be known now. An electric system will function in a successful, reliable and efficient manner for any kind of railway service. It is capable of unlimited hauling capacity, is flexible as to speed and has important features conducing to safety in handling trains. The fundamental question affecting its adoption, however, is this: "Is the substitution of electric for steam haulage warranted by its advantages in the production of more transportation, and if so, is it practicable financially?" No sweeping generalization to the effect that electric traction will be used because it functions well will impress railway managers; they must have the answer to the above question.

Now, as regards the first portion of this query, it would appear that there are a number of important situations in which electric traction will produce results which cannot be had by the steam locomotive, notably in increasing existing track capacity, especially on lines having heavy grades, in yard shifting, in suburban and terminal services, and in locations (such as in tunnels) where the absence of combustion is necessary or desirable. Such installations should be undertaken if financially feasible, and feasibility can only be determined by a critical examination of each case. Assuming that the money can be raised for an improvement which will pay, it will be found that electric traction will pay, directly or indirectly, in the special cases to an extent depending upon the density of traffic and the difficulty of maintaining proper steam operation.

It must be admitted that an electric installation involves a higher first cost than steam; in fact, its adoption means that more or less existing investment must be scrapped. Therefore, the increase in fixed charges must be offset either by the direct operating savings produced or these plus the indirect savings and benefits. The latter may mean avoidance of permanent-way additions, permissible change in operating methods, greater traffic movement and production of new kinds of traffic. In spite of some differences in opinion, we cannot escape the conclusion that there is always a large saving in fuel with electric traction, generally some saving in maintenance cost of "power equipment" and often important savings in train crew costs, engine house expenses, minor supplies, etc.

In conclusion, Mr. Gibbs said that sometimes the "direct" savings will be sufficient to return a handsome profit over and above charges; if not, the indirect savings must be included. It will avoid future disappointment if the facts are faced. The electrification of the railways of the country as a whole, or the electrification of the whole of any extensive component system, is neither practicable nor desirable, measured by costs and results; the doom of the steam locomotive has not been sounded and will not be in our time. But the fact that electrification is not universally applicable should not discourage any one; it has a very large and profitable field (both for the railways and the manufacturers). These facts indicate the importance of carefully investigating each proposed application to insure that it is properly conceived and carried out.

Rail-Light Bowlers at Play

THE Doherty Men's Fraternity League, which takes the place of the joint company section of the Toledo Railways & Light Company, Toledo, Ohio, has issued its bowling schedule for the 1920-1921 season. All departments of the company are represented by teams, and sixteen alleys are required for the weekly game. As the rules may be suggestive to men interested in developing interest in sports on other properties, they are given below:

This bowling league shall be known as the Doherty Men's Fraternity League and shall be governed by A. B. C. rules.

The entrance fee for each team shall be $10, one-half of which is to be added to the prize money furnished by the company and one-half to be used as forfeit money, which will be returned in case the team finishes its bowling schedule.

All fines will be taken out of prize money at the end of the season.

Each team will be limited to eight men, not more than two of whom may be "A B C," "All-Star" or "Greater Toledo League" bowlers.

If a team appears on the alley with only four men the average of that absent member of the team who has rolled the greatest number of games shall be used as the fifth man's score.

All disputes shall be referred to the grievance committee for adjustment and its decision shall be final.

Regular games shall be bowled on Tuesdays at 8:30 p.m., one-half on the Colonnade and one-half on the Auditorium alleys.

ELECTRIC RAILWAY PUBLICITY

Devoted to How to Tell the Story

Further Suggestions as to Movies

SOME suggestions regarding the use of movies were printed in last week's issue of this paper, and the following additional communications are given to indicate the continued interest in this subject as a practical means of railway publicity.

F. W. Brooks, president Detroit United Railway, writes in regard to the suggested use of motion pictures in a broad way in the promotion of electric railway publicity work: "I think the suggestion well worth earnest consideration, keeping always in mind the fundamentals set forth in your article."

F. R. Coates, president Toledo Railways & Light Company, writes that he "fully concurs" with the ideas expressed in the editorial suggestion in the Sept. 25 issue of the JOURNAL.

A prominent general manager of a Western street railway writes the significant comment that "any statement emanating from a public utility as to the conditions confronting either the utilities as a whole or the particular utility must have the stamp of genuine 100 per cent truth upon it or it will do more harm than good."

A. E. Potter, general manager the Rhode Island Company, writes:

"I believe that with a proper person heading a publicity department much good can be done in creating a better understanding on the part of the public as to the problems which confront a street railway.

"I am not so strongly of the opinion that motion pictures would be particularly beneficial, but might feel differently if there was an opportunity to try the experiment."

Circulation Must Have First Consideration in Working Out Film Plan

ILLINOIS COMMITTEE ON PUBLIC UTILITY INFORMATION

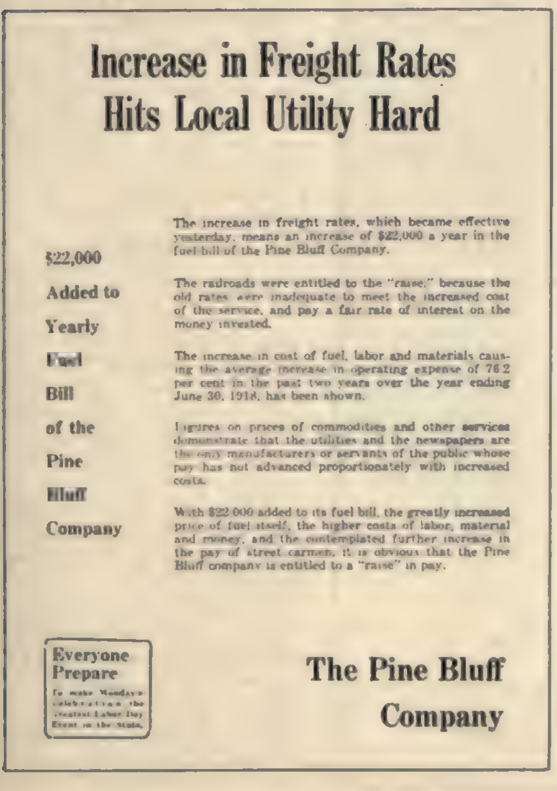
CHICAGO, ILL., Oct. 26, 1920.

To the Editors:

No one can doubt the effectiveness of motion picture films intelligently conceived, adequately executed and consistently and extensively employed. At the same time I am not yet ready to admit that any means of publicity is better than the newspaper. It is true that a great many people patronize "the movies" and it is also true that the great numbers who do not are usually the kind of people who are susceptible to influence by educational publicity and who when duly influenced are of the most assistance to the utility business. It is also true that almost everybody reads the newspapers and our impressions and opinions are in very large measure, and without our always realizing it, based upon what we read in the newspapers.

Please do not misunderstand me as in any way decrying the advisability of using motion picture films. I believe in using all means of publicity and films are one of the best. But you will doubtless find, as I have whenever attempt has

Information Campaign in Newspaper Advertisements



Increase in Freight Rates Hits Local Utility Hard

$22,000 Added to Yearly Fuel Bill of the Pine Bluff Company

The increase in freight rates, which became effective yesterday, means an increase of $22,000 a year in the fuel bill of the Pine Bluff Company.

The railroads were entitled to the "raise," because the old rates were inadequate to meet the increased cost of the service, and pay a fair rate of interest on the money invested.

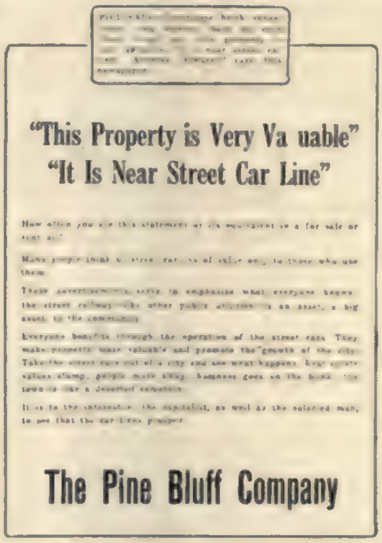
The increase in cost of fuel, labor and materials causing the average increase in operating expense of 76.2 per cent in the past two years over the year ending June 30, 1918, has been shown.

Figures on prices of commodities and other services demonstrate that the utilities and the newspapers are the only manufacturers or servants of the public whose pay has not advanced proportionately with increased costs.

With $22,000 added to its fuel bill, the greatly increased price of fuel itself, the higher costs of labor, material and money, and the contemplated further increase in the pay of street carmen, it is obvious that the Pine Bluff company is entitled to a "raise" in pay.

Everyone Prepare
To make Monday's celebration the greatest Labor Day Event in the State.

The Pine Bluff Company



[illegible]

"This Property is Very Va uable"
"It Is Near Street Car Line"

How often you see this statement or its equivalent in a for sale or rent ad?

Many people think of street car lines of value only to those who use them.

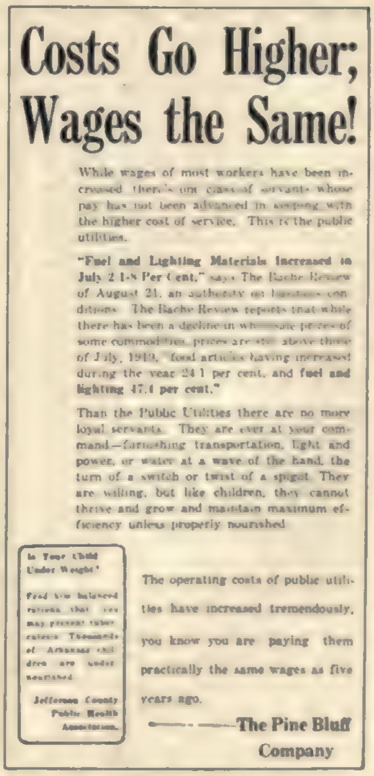
These advertisements serve to emphasize what everyone knows—the street railway, like other public utilities, is an asset, a big asset to the community.

Everyone benefits through the operation of the street cars. They make property more valuable and promote the growth of the city. Take the street cars out of a city and see what happens. Real estate values slump, people move away, business goes on the bum, the town is like a deserted cemetery.

It is to the interest of the capitalist, as well as the salaried man, to see that the car lines prosper.

The Pine Bluff Company

The Pine Bluff (Ark.) Company has been running a series of newspaper advertisements in its publicity campaign. Some of these are shown for the ideas they may suggest for use elsewhere.



Costs Go Higher; Wages the Same!

While wages of most workers have been increased there's one class of servants whose pay has not been advanced in keeping with the higher cost of service. This is the public utilities.

"Fuel and Lighting Materials Increased in July 2 1-8 Per Cent," says The Bache Review of August 21, an authority on business conditions. The Bache Review reports that while there has been a decline in wholesale prices of some commodities, prices are still above those of July, 1919, food articles having increased during the year 24.1 per cent, and **fuel and lighting 47.1 per cent."**

Than the Public Utilities there are no more loyal servants. They are ever at your command—furnishing transportation, light and power, or water at a wave of the hand, the turn of a switch or twist of a spigot. They are willing, but like children, they cannot thrive and grow and maintain maximum efficiency unless properly nourished.

Is Your Child Under Weight?
Feed him balanced rations that you may prevent tuberculosis. Thousands of Arkansas children are under nourished.
Jefferson County Public Health Association.

The operating costs of public utilities have increased tremendously, you know you are paying them practically the same wages as five years ago.

—The Pine Bluff Company

been made to get down to the concrete facts in relation to motion picture films, that the detail of getting the film shown—in other words, in getting the thing we call "circulation" in newspapers—is one to be considered first and always, instead of last as it usually is. The film that isn't shown doesn't do much educating.

BERNARD J. MULLANEY,
Director.

Film Publicity So Effective that Expense Should Be Secondary

CHICAGO SURFACE LINES

CHICAGO, ILL., Oct. 26, 1920.

To the Editors:

Accepting the invitation for criticism and suggestions on the "Next Step in Publicity Work" editorial suggestion in your issue of Sept. 25, page 604, I am pleased to outline my views on a subject which should be considered seriously by the industry.

There is no question in my mind but that the average citizen could be reached most surely and most effectively by the "movies," and if each electric railway company could afford to produce and circulate its own appeal by the far-reaching film story the results would be more than worth while. For many companies, of course, this means of publicity would prove too costly. The next proposition, then, is to have the industry "get behind" a national railway film.

As your editorial points out, "the success of any motion picture publicity will depend on the character of the film." Herein is the real problem. Can a scenario be prepared which will tell the story desired by the electric railways and at the same time prove interesting to the public and acceptable to the managers of the motion picture theaters? Upon first thought one might answer "yes," but when one thinks of the various sizes of railways to be suited and of the widely different classes of audiences to be reached the answer does not appear so easy.

I recall an interesting film of this character which I saw some years ago telling the story of progress in steam railroad transportation from the beginning up to the latest electrified locomotive. A similar story for electric railways would be easily prepared, but to my mind this would not reach the object desired, namely, a more sympathetic understanding of the electric railway problem. Another film which I saw was used in the campaign for a new franchise for a railway company. It pictured some of the improvements contemplated, including extensions to parts of the city which were urging better transportation. Another "movie" which suggested the value of this medium for reaching a large portion of the public was the film shown by the Kansas City Railways at Atlantic City recently. Many of your readers probably have seen the series of films issued in the name of the Ford Motor Company telling the story of various industries. These films appear to represent a high character of workmanship and they undoubtedly interest the average spectator. One noteworthy feature is that they tell their several stories briefly. This element should be borne in mind in any scenario issued on behalf of the electric railways. The "story" must not only be interesting, it should also not be dragged out. It is quite likely that the "national railway film" will in the end develop into a series of films—one series, perhaps, telling the story of the interurbans and another the story of the urban systems.

The difficulty will be in having leaders of the industry agree on the essentials of the story to be presented. If this can be done the new factor in publicity work is bound to be so effective that expense should be considered a secondary element. It might even be worth while for the Committee of One Hundred to offer a cash prize for the most satisfactory scenario presented.

J. V. SULLIVAN,
Assistant to the president.

Rhymes of the Underground

Adolphus Minns resides at Kew
And does what people ought to do.

In boarding trains his instincts are
To "let 'em first get off the car,"
Then "hurry up" himself to enter
And "pass along right down the center."

Though nigh his destination be,
No selfish "door obstructor" he;
Rather than bear such imputation
He'll travel on beyond his station.

His unexceptionable ways
E'en liftmen have been known to praise—
A folk censorious and, as such,
Not given to praising overmuch.

Small need have they to shout a grim
"No smoking in the lift" at him,
Or ask if he's the only one
For whom the lift is being run.

Adolphus Minns, who lives at Kew,
Does all that people ought to do—
Retires to bed before eleven,
Is up and shaved by half-past seven—
And, when he dies, he'll go to Heaven.

Perhaps he's gone; I've never met
His like at Kew or elsewhere yet.

—From *Punch*, London.

Suggestions for a Series of Films Which Must Be Short to Succeed

WINNIPEG ELECTRIC RAILWAY

WINNIPEG, CANADA, Oct. 22, 1920.

To the Editors:

The "call to arms" in the interests of publicity for the street railway industry, sounded by the ELECTRIC RAILWAY JOURNAL in its Sept. 25 issue, is opportune. The success which has attended the inauguration of a policy of publicity, as various records of companies will show, should prompt all interested in the future of electric railways to give further thought to this phase. Further research in the question of "putting publicity over" is fully warranted by the results so far achieved, especially so when one considers that publicity for street railways is a comparatively new development.

In contemplating the future, the opportunity for development seems to be not so much in "what story to tell" as "what is the most effective medium of telling it." It does not appear that there is much left unsaid by the various publicity campaigns which have been carried on in all parts of the country. Certain it is that if these had only been 100 per cent effective there would be no further need of publicity. So, while the street railway "stories" can be told again and again in a variety of forms, there remains to be developed new and more effective avenues of telling these stories.

The suggestion of the JOURNAL that the motion picture field is worth considering as the next possible step in street railway publicity is worthy of the most serious consideration. To the questions as to whether the street railway story can be told in motion pictures, and if, when told, such pictures can be placed in motion picture theaters throughout the country, I would answer emphatically "Yes." It has been my experience that motion picture theaters are open for the exhibition of advertising films in return for free advertising on the street cars, such advertising to take the form of window or dashboard posters.

A brief reference might be made to the public market which the motion picture field offers. In a city of, say, 200,000 people there will be an average of twenty-five motion picture houses, showing to audiences aggregating, weekly, 250,000 people. Of these picture houses, six will be classed as "first run" houses, which will not show films as a "second run." This means that five of the twenty-five theaters will not show a film, but the remaining twenty will. A conservative estimate will place the number of people which these twenty theaters play to in one week at 150,000. In larger cities the figures are correspondingly increased.

In Canada one of the large steam railway companies has started a news film service, which is carried by a chain of vaudeville houses. A few interesting "news" views are shown, ending with views of scenery or holiday resorts and fishing retreats reached by the line of that railway, although the people are not told in the film that they have to take this line to reach the places shown. If a steam railway finds it profitable to put on a film of this nature for the purpose of increasing passenger traffic, surely the electric railway companies of this continent will find it a good investment to show a series of films designed to effect a more thorough understanding between the public and street railways regarding the problems confronting them. It would appear that if the motion picture field is to be fully developed it should be on a national basis, with pictures sent out by a national syndicate and with the costs of operating such a syndicate borne by a pro rata assessment on the various company members.

The next question and a most important one to be considered is the matter of the character of the films. The films must be acceptable to the public and acceptable to the motion picture manager. The story to be told of the street railways is a long one and should be divided into a series of small films averaging 750 or 1,000 ft. in length, each film to be definite and complete in itself. Just by way of suggestion as to what these films should be, I think that it might be well first to depict the construction of a street car, tracing the treatment given the wood, steel and other material from the time they enter the factory to the finished product, like "The Making of a Ford Car." Very few street car patrons have any conception of the intricate motors and massive machinery hidden by the floor of the street car on which they are traveling. This film would carry smart subtitles and would close with a bill summarizing the costs of construction. It might be advisable to contrast these costs with pre-war figures.

A second picture might very well deal with unique street car accidents. Every street railway has a record of some unusual accident which can be easily portrayed on film and such a film might show how such an accident might have been avoided. Exhibition of such a film would hold public interest and be of tremendous educational value.

A third film to be sent out from this "American Electric Railway Cinema Syndicate" might very well deal with the history of transportation—always an interesting story. The development of street cars, from the old horse cars with their inconveniences to the present-day cars with their "elegancies of travel" would be shown, with views of the new one-man cars.

The question of "service" might be dealt with in a fourth film. Views could be taken of the carhouses of some large system, showing the preparations made just prior to rush-hour time. Next view might show a factory with thousands of workers pouring out into the yard and the cars lined up in procession ready to deal with them. Here and there a view of queue formation might be shown, with a hint that this method of loading means quicker service. It occurs to me that the handling of crowds and the various methods adopted would almost occupy the length of a film itself, if all the various factors were to be depicted. Other views would show snow sweepers in action, while others would show the "dispatching" offices and other interior workings of some of the big systems. All these factors would have a cumulative effect in impressing the public with the amount of service they receive for their few cents.

A fifth film might be confined entirely to the inner workings of a street railway company. Views of the machinery which sorts out the nickels, the dimes, the pennies, and also the tickets might be shown; also the mass of pennies received in one day, and what becomes of them. Other interesting labor saving devices might well be shown with interest to the public and benefit to the companies. This film might also carry some views of how complaints are handled, and giving an insight into the trainmen's training school.

And so on. I should think that probably a dozen or more such films could be developed and sent out to the various cities. A reel or two would have to be devoted to the financing end of the street railway business. A story might be told along the lines of "Autobiography of a $100 note," representing the year's savings of a young man. He withdraws it from the savings bank, places it in a trust company, which in turn puts it with others to buy street railway securities. The interest which this $100 should rightly earn might be shown in the form of a cartoon. First we see, say, a $10 bill on the screen, representing the interest. Along comes a jitney and takes a slice of it. Then comes franchise taxes and impositions and takes another slice; a Ford car takes another slice, and finally along comes old man H.C.L. and swallows the remainder.

I believe any company which is able to place a series of, say, a dozen such films in several of the leading picture houses in the city in which it operates will find a wonderful return for the comparatively small amount of money required to have the films made.

I would close with a warning—don't attempt to make one long picture telling the street railway story. Motion picture houses positively will not show them. The only chance whereby it is possible to get industrial films shown is by limiting them to 500 or not more than 1,000 ft. I know several large concerns which have had long industrial films made for advertising purposes, at enormous expense, and then have been unable to get them exhibited. Theater managers will take short industrial pictures; They will not take long films.

HERBERT C. HOWARD,
Publicity Agent.

Merchants Can Help the Railways

CLOTHING ADVERTISEMENT FEATURES ECONOMY OF CAR SERVICE

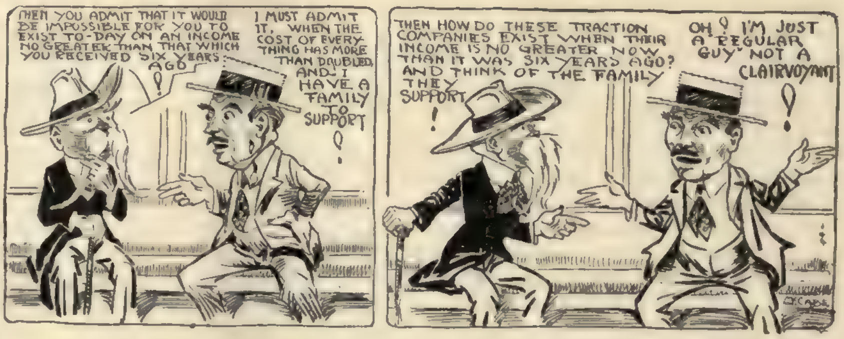
THE accompanying illustration is from an advertisement in the San Francisco *Examiner*. It is not a street railway ad either, but primarily features the clothing worn by the hero of the episode depicted, which are "Langham Clothes." While the young lady has her eye on the vacant taxi, her escort evidently prefers the car, in the interest of economy and safety. The comment made by the correspondent who sent in the clipping containing this advertisement was: "If the street car is to be featured with ready-made clothing as a modern thrift ideal, it may be said that electric railway publicity is at last beginning to produce results."

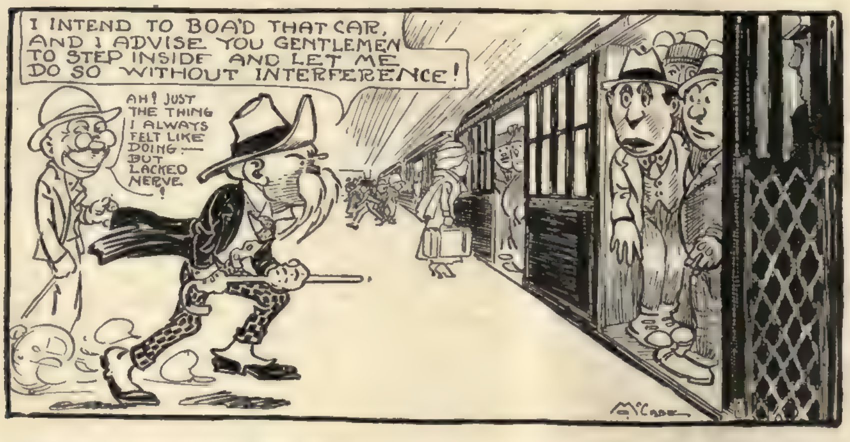
As Seen by the Cartoonist

AH, THERE MAY BE SOME THING IN THIS FOR ME
OH, MAMMA! HIS COAT TAIL GOT CAUGHT IN THE DOOR
IF THAT GUY IS HURT, I'M DEAD AN' BURIED!
YOU SAY THAT YOUR RIGHT ARM IS HURT?
SURE, ME RIGHT ARM IS HOIT!
THE GENTLEMAN FIRST CLAIMED THAT IT WAS HIS LEFT ANKLE RECEIVED THE INGURY!
McCABE

HOW OFTEN DO THEY COLLECT FARES BETWEEN HERE AN' BROOKLYN?
THEY DON'T COLLECT AGAIN, YOU CAN RIDE TWENTY MILES FOR A NICKEL ON THIS ROAD!
McCABE

YOU ARE IN MY POWER!
AND I KNOW IT!
HIGH COST OF EVERYTHING
I.R.T. Co.
McCABE


THEN YOU ADMIT THAT IT WOULD BE IMPOSSIBLE FOR YOU TO EXIST TO-DAY ON AN INCOME NO GREATER THAN THAT WHICH YOU RECEIVED SIX YEARS AGO!
I MUST ADMIT IT, WHEN THE COST OF EVERYTHING HAS MORE THAN DOUBLED AND I HAVE A FAMILY TO SUPPORT!
THEN HOW DO THESE TRACTION COMPANIES EXIST WHEN THEIR INCOME IS NO GREATER NOW THAN IT WAS SIX YEARS AGO? AND THINK OF THE FAMILY THEY SUPPORT!
OH! I'M JUST A REGULAR GUY NOT A CLAIRVOYANT!
McCABE


I INTEND TO BOA'D THAT CAR, AND I ADVISE YOU GENTLEMEN TO STEP INSIDE AND LET ME DO SO WITHOUT INTERFERENCE!
AH! JUST THE THING I ALWAYS FELT LIKE DOING—BUT LACKED NERVE!
McCABE

GIRLS, BEHOLD! THE ONLY THING I'VE BOUGHT TO-DAY WHICH I HAVEN'T HAD TO PAY A DOUBLE PRICE FOR!
OH, A SUBWAY TICKET!
AIN'T SHE THE "CUT UP"!
McCABE

THAT'S THE PLACE, RIGHT IN THERE!
BANKRUPTCY
5¢ FARE
I.R.T. Co.
INCREASED COST OF LABOR. EQUIPMENT. EVERYTHING.
McCABE

YOU SHOULD HA' LOOKED UP THAT STREET YERSELF, BEFORE YOU'D GOT ON TH' CAR, WAT CHANST 'AV' I GOT? I'M BUSY EVERY MINUTE!
OH; I THOUGHT YOU MIGHT HAPPEN TO KNOW!
YES SIR! BRADHURST AVENUE IS ON THE "WEST SIDE" AND I'LL TAKE YOU WITHIN ONE BLOCK OF IT!
OH, THANK YOU!
McCABE

Mr. McCabe, who draws for the "Interborough Bulletin" and "New York Railways Employees' Magazine," has a happy way of picturing the needs for a higher fare on the New York transportation systems, as well as some of the foibles of the traveling public. This selection of some of his recent cartoons in these publications includes several of "Colonel Biff," who is always ready to say and to do the right thing in the right place at the right time.

The Job of a Public Relations Representative*

How a Newspaper Man for Twenty Years Analyzes the Problem of the Electric Railway in Getting Its Story Over to the Public—The One Big Rule to Follow Is to Know the Man to Be Reached and to Talk His Language

BY FRED A. CUMMINGS
Public Relations Representative Eastern Massachusetts Street Railway, Boston, Mass.

I WISH to make it plain at the start that I am not a street railway man. I am fundamentally a newspaper man, having worked for twenty years on the territory of the old Bay State system, and as such I did everything possible, both as editor and reporter, to put the railway in wrong. I don't desire to take back anything I said about the old régime of the Bay State, however. I was one of the most hostile newspaper men in the region. I was strong for the proposals of organized labor on the system and felt that the people at the top were a bunch of "highbrows" and were unable to handle the "lowbrow" element which actually operated the property.

I have been with the Eastern Massachusetts Street Railway for about a year now and I wish to state that I am all over my hostility, for I have seen the other side. I wish to emphasize, though, that the hostility in the newspapers toward the street railway seems to me to be because the street railway has never attempted to maintain cordial relations and to obtain the viewpoint of the man who sits at the city editor's desk. The average street railway man thinks a newspaper man is excess baggage and has the aim in life to give the street railway the worst end. This emphatically is not so. The street railway man must study the problems of the man at the city editor's desk and make it possible for him to get the right slant on news of all sorts. In general, the reason why the public is so misinformed is that the street railway has not come half way in explaining its difficulties to the newspapers.

My first act upon joining the staff of the Eastern Massachusetts system was to take a ride over the entire system. I then expressed myself to the managers of the property that this railway is a public institution and any man in the district which the railway serves has a right to ask any question with reference to its operation. Full and complete publicity to the community served is by far the best policy. Further, the manager, when he is talking to newspaper men and when he is acting in charge of his property, should think "What would I do if I owned this property?" and then act in accordance with the answer to that question. Railway managers should get in close touch with newspaper men, who above all others probably have the feel of the pulse of a community, and the newspaper men are then only too glad to make sure that they get the right story on all street railway matters from the manager.

My own duties have to do with more than publicity in that I have a general undefined "department of public relations." Frankly, I started with the idea that the top man tried to scheme his best to put down the man underneath. As frankly I now admit my error, for, as I have investigated electric railway situations, I find that the man at the top comes more than half way in his treatment of the men on the property. But the fellow at the bottom is not so constituted as to come half way until the manager proves to him his integrity and honesty of purpose. The public relations man is an important factor in this last act. If I may cite one case of my own experience: I asked leave to speak to a large group of men who were contemplating making trouble on the property and was unanimously refused. When these men gathered the next day, however, I was there on a platform telling these men in their own language that they had the wrong dope and proved to them the good intentions of the management and showed them that the management was acting upon these good intentions.

One of our problems in Massachusetts has been the elimination of jitneys, and we rid ourselves of this type of competition by intelligent organizing of public information as to exactly what it meant if the jitneys were allowed to continue to operate. I went to each newspaper and put our entire analysis of receipts and expenditures on the table of the city editor. I told him I was ready to answer anything he desired to know; that the company was in a life and death struggle and asked for a fifty-fifty chance in treatment of its situation by his newspaper. We did not ask any favorable editorial treatment, but asked for fair play, and got it. There was, naturally, some strategy in the elimination of jitneys in some of the towns and it was necessary to take definite stands in order to impress upon the communities the actual facts of the situation and the seriousness of the condition of the company with continued jitney competition.

In this connection I would emphasize that no whiner gets any sympathy. It is necessary to send some one out who can and will say "liar" when it is necessary. This sometimes brings a charge of arrogance against the railway man, but our experience has been that the final result is an appreciation on the part of the public that we knew our business and were working for the good of the community, as well as for ourselves, and we finally came to an agreement with the community.

Now where do electric railways get off? We are hedged in on all sides by public utility commissions, but no commission in existence will be allowed by the public to make a street railway operate at a loss, if the street railway itself will spend a little money in the right kind of publicity. Electric railways in the past, however, have hired too many publicity men who thought only of the creases in their trousers and the flowers in their buttonholes. It is necessary to mingle with newspaper men and get in with them. Usually the best publicity men are lower down in the ranks; those who get the jobs, however, are generally better with their mouths than with the typewriters.

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*Abstract of address delivered before the joint meeting of the New England Street Railway Club and the Providence Section, American Electric Railway Association, Providence, R. I., Oct. 7, 1920.

The trouble with you electric railway men is that you don't know the psychology of the public mind. You don't let the whole story get out. If you electric railway men are thinking of publicity, don't hire a man in whom you don't have entire confidence. Get one who knows the psychology of the newspaper office and the city editor's desk. It is absolutely necessary to get the state of mind of the city editor for all publicity work. You can be confident that a city editor will not lie or misrepresent, and often a city editor makes the best publicity man the railway can get hold of when he is correctly informed. But most of them start wrong. In our own district all Boston newspapers were instinctively against the street railway—all boys in the business grow up in that attitude. This is typical of other situations, and the newspaper men must be educated.

Furthermore, give the public answers to the questions it is interested in. People in general don't care about our financial condition in the abstract. What the public really desires to know is, why aren't the cars on time? Why aren't the cars clean? Why aren't trainmen courteous? Poor rails and cars get on the nerves of the public. If this is what the public wants to know, tell the newspapers why and tell them in the right way, and they will help you out.

Now I want to point out that if any other industry had been abused—had been assassinated, it might be said—as has the electric railway industry it would be dead and buried. The only thing that has kept the electric railway alive to date is its absolutely intrinsic necessity. On account of the industrial and transportation situation, there is a big future for electric railways, if only each man connected with the railways will convince himself that this is so.

One of the most interesting phases of my own experience as a public relations representative has been how the public takes hold of the one-man car. We operate at present 200 of these and have fifty more coming. We also operate some double-truck one-man cars. There were some organization troubles, but 90 per cent of the people on the Bay State system are perfectly satisfied. W. D. Sullivan, managing editor of the Boston *Globe*, said recently that the one-man car was certainly a wonderful idea and was proving so, especially in his vicinity. He wondered why it took electric railway men till 1920 to knock one useless man off of the car in justice to both the public and the men. The cheaper operation resulting from the one-man car makes wages higher and fares lower.

[In the discussion which followed Mr. Cummings' address, abstracted above, he clarified his attitude toward organized labor by declaring that street railways would make a mistake to try to change present conditions. He said he knew the men were 90 per cent good and that it was better to take care of the other 10 per cent, regardless of some of their dissatisfaction. One man may be a terrible demoralizer, but he must be educated.

With reference to one-man cars he said that the company first put in 200 Birneys and then added thirty two-truck one-man cars. From this experience the company decided to convert other two-truck cars to save platform expense only, as these cars fitted the track and traffic conditions met on the eastern Massachusetts system. The system as a whole is largely a one-man car property and both Birneys and double-truck one-man cars can be used.—EDS.]

Repair Shop Facilities and Equipment

Suggestions for Providing Proper Shop Facilities for Maintenance and Overhauling of Railway Equipment of Electrified Steam Lines

AT THE annual convention of the Association of Railway Electrical Engineers held in Chicago, Oct. 19-22, the committee on electric repair shop facilities and equipment gave a proposed arrangement for a repair shop of an electrified railroad.

The plan assigns a space for a storeroom and the committee recommends that the supply of those parts used only for motor repairs be carried in a substore at the electrical shop rather than in the general storeroom. If this is done the foreman of the shop will know at all times what material is on hand, on order and in the shop being made up, and he can be made responsible for keeping a well-balanced stock. By this arrangement a great deal of time will be saved that necessarily would otherwise be spent going to and from the general store for material, and a considerable saving in material should be effected, as practically exact amounts needed would be used and could be accurately charged to the various jobs.

Suitable storage rack should be provided in the main shop for incoming equipment to be repaired as well as finished work. This applies particularly to armatures and motors. A low, heavy table is desirable on which defective motors can be placed, thereby raising them above the floor level so that the workmen can more readily inspect and test them. Power circuits should be convenient to this table for all voltages used in the shop or division of the railroad for which this shop makes motor repairs. The table should be sufficiently large to accommodate easily the various testing instruments used in diagnosing the trouble. After it has been decided what part of the motor is in need of repair it can be torn down on the testing bench. The part in need of repair should then be placed in a box where all dirt can be blown from it by compressed air. This box should be provided with an exhaust blower so that dust and dirt will be taken away and deposited at some convenient point.

Ample bench room should be provided along the wall under the outside windows, and at each vise there should be a drawer for taking care of mechanics' tools, a gas and air connection, also a test lamp in the lighting circuit with permanent portable points to be used for general testing.

Winding racks for handling armatures and rotors undergoing repairs are necessary. These should be designed to take care of any length of armature to be handled, and preferably one head should be adjustable in order to cut down the total number of racks required.

DIPPING AND BAKING ARMATURES

There is some difference of opinion as to whether or not it is desirable to dip and bake an armature after it has been repaired. If it is decided that dipping and baking is desirable the armature should first be dried in an oven for ten hours at a temperature of 100 deg. C., the commutator and bright metal parts should then be taped with friction tape and the armature immersed and allowed to soak in the insulating material until all signs of bubbling cease, which will be at the end of about twenty or thirty minutes. When bubbling ceases it indicates that practically all of the air and moisture has been driven out of the windings and it should then be placed in a carrier on wheels in such a manner that the shaft will be perpendicular and immediately placed in the oven, where it should remain until the varnish is dried and hard. The temperature of the oven should remain at not less than 100 deg. C. By standing the armature on end the excess compound will drain out in such a way as to not throw the armature out of balance, as would be the case if it were laid on its side.

The committee recommends that the impregnating tank be sufficiently large to immerse completely the largest armatures and that a suitable cover be provided to cover the tank when not in use. The oven should be amply large to handle a number of the largest armatures at one time and doors should be provided so the armature carrier can be wheeled in.

MACHINES, COIL WINDING AND TESTING APPLIANCES

Other equipment that should be furnished in the shop includes a small lathe, drill press, foot-power squaring shear, coil-winding machine, taping machine or taping attachment, commutator slotting machine, as well as a rack for storage of conduit from engines undergoing repairs in the shop, a pipe bench and vise, bench for repairing and testing headlight turbines and shelving for miscellaneous material coming into the shop for repairs.

For railroads located a considerable distance from the large electrical manufacturing concerns the committee recommends the winding of all armature, field and stator coils, since with a good winding machine these coils can be very quickly assembled by a first-class workman, and by following this arrangement a large reduction can be made in the amount of store stock. If the attempt is made to carry coils for the various types of motors a large stock is necessary, whereas when coils are made up as needed, because of the fact that a great number of these coils are wound with the same size wire, it is only necessary to carry a comparatively small amount to take care of repairs. For example, consider three motors using the same size of wire in the coils:

	Amount of Wire	No. of Coils
Motor No. 1	75 lb.	50
Motor No. 2	60 lb.	40
Motor No. 3	90 lb.	60
	225 lb.	150

In order to have a sufficient number of coils available to rewind completely any one of these motors it would be necessary to carry in the store 150 coils of approximately 225 lb. of wire. If coils are wound as needed a supply of 100 lb. of wire would be ample stock to carry, as this amount would be sufficient to make up a complete set of coils for any one of the motors. Obviously if this practice is extended a large saving will result.

The committee recommends in connection with any repair shop a liberal supply of portable ammeters and voltmeters for all the voltages in use. It also feels that a megger is a desirable addition to the equipment of such a shop. By making regular insulation tests of motors in service with this instrument a great many motor defects can be detected and corrected before serious trouble develops, thereby considerably reducing the number of armatures and motors requiring complete overhauling.

In a repair shop that takes care of motor repairs on the rest of the road or division to which usually the entire motor is sent when it fails the committee recommends the installation of a generator in the electrical shop for use in testing out these motors after they have been repaired. The motor to be tested should be belted to the generator and the generator loaded by means of a water rheostat. In this way the motor will have been tested thoroughly before being returned to its original location.

Electric Welding for Railway Shops

Requisites for Successful Welding Are Emphasized and Economies that Result Shown in Report of Committee

IN THE report of the committee on electric welding, presented at the annual convention of the Association of Railway Electrical Engineers held in Chicago, Oct. 19-22, some facts of interest to electric railways were given.

The report stated that by certain methods various jobs can be safely and economically welded, but attention should be directed to three prime requisites that must be completely and thoroughly met if the application of the process is to be a success. (1) Proper material for making the weld; (2) rules and methods for properly using these materials, and (3) intelligent application of the process to the various mechanical devices or articles that are to be welded.

It should be realized by all that in any autogenous weld the best that can be done is to obtain good cast iron, cast steel or alloy steel in the weld, the casting in this case being the added metal in the weld, or, in other words, the weld itself. No effort should be spared to secure the proper materials for welding. If high grade materials are to be joined, whether the joint be in truck frames or boiler steel, the proper materials for constituting the weld should first be secured.

No expense or pains should be spared in an unswerving endeavor thoroughly to train mechanics until they are capable of making first-class welds with a high average of efficiency and factor of safety.

To secure success (or, perhaps better still, lasting success) in electric arc welding the co-operation of all concerned is an absolute necessity, including the mechanical engineer, the engineer of tests, or metallurgist, the superintendents of motive power and rolling stock, the master mechanic, the foreman and the operators themselves. Fully 90 per cent of all welds that have failed in service have been due to the use of the wrong welding material or unfamiliar or unintelligent application in the design, or inexpert execution of the weld.

The requirements necessary for securing good welds vary broadly, first by group and then by detail member or class. Group arrangement is as follows: Plate material, shapes, forgings, cast iron, cast steel and malleable iron, and yet another (and one which is just now coming to be a very important one), *viz.*, track steel.

The plate group may be subdivided into two classes, first, where free or loose plate material is welded, and, second, when welded in structural or vessel form, which may in turn be again subdivided into non-pressure, low-pressure and high-pressure vessels. All non-ferrous metals are classed together in a second general classification.

In conclusion, the committee feels that it would not be advantageous to submit a report at this time, other than the progress report which has just been outlined, because the present developments are in the evolutionary stage and the test data and research matter gathered during the past three years are not in shape to present at this time.

Letters to the Editors

Suggestion for New Dimensions of Safety Car

THE WILKES-BARRE RAILWAY COMPANY

WILKES-BARRE, PA., Oct. 27, 1920.

To the Editors:

At the joint meeting of the Transportation & Traffic and Engineering Associations on safety car operation, held at the Atlantic City convention, the discussion brought forth the fact that, in one instance at least, the present standard safety car is not considered as being of sufficiently ample dimensions for the service it would be called on to perform.

To meet the demands which would be made on it would necessitate increasing the weight from 16,000 lb. to between 18,000 and 19,000 lb., with the result that the present standard two-motor equipment may prove inadequate. To increase the motor equipment rating under present methods of motor suspension and gearing means a considerable increase in weight.

In order to keep weights down and to increase the clearances between the motor cases and street crown, the writer suggests that, instead of adhering to the conventional method of suspension, the number of motors per car be restricted to one instead of two and that this single motor be hung longitudinally on the truck with the ends of the armature shaft coupled flexibly to transmission shafts carrying worms meshed to suitable gears on the car axles.

In this way a single high-speed motor of small weight and dimensions may be used with greater efficiency than could be attained by splitting the load between two low-speed motors, each of half the rating of the high speed unit.

It is interesting to observe the relation between the costs and weights of a single high-speed motor equipment and a double low-speed motor equipment each motor of which is of half the rated capacity of the single high-speed equpment. Assuming the ratio of a two-motor equipment armature speed to a single motor equipment armature speed to be as 1 : 2.8, then the weight of one-motor equipment is about 41 per cent and the cost about 48 per cent of a two-motor equipment aggregating the same horsepower.

With regard to the worm drive the writer has been in touch with a manufacturer of gears of this type for automobile trucks and is informed that gear ratios as low as 1: 5 can easily be obtained and that their efficiency is very high and ranges from 92 per cent when new to between 97 and 98 per cent when worn in. The worm drive is quite noiseless in operation and will not bind the motor when the car is coasting. Being located in the center of the car axle it is freer from water and dust accumulations than would be a gear placed close to the car wheel.

It may be argued against this method of drive that all the eggs are in one basket and that should the single motor for any reason become inoperative the car would have to be pulled in. This is, of course, true; however, with the frequent service made possible with safety cars, no great delay should be incurred by such a mishap, as the following car could quickly push the cripple to a switching point and clear the road.

As against this argument, it will readily be admitted that one motor is easier to maintain than are two and consequently there is less excuse for a defective one-motor equipment than there is for a faulty two-motor equipment. Further, with a single-unit equipment the car and controller wiring should be reduced and simplified, thus removing, in part at least, another possibility of trouble.

While the suggestion outlined above may appear radical, it must not be forgotten that the whole safety car idea is itself a radical departure from what has heretofore been considered as standard practice, and if the scheme here presented is feasible and offers certain advantages ultra-conservatism should not be permitted to prevent its consideration.

J. KENNEDY MANN, Electrical Engineer.

Pole Shifting Is Not as Simple as It Looks

BROOKLYN RAPID TRANSIT COMPANY

BROOKLYN, N. Y., Oct. 19, 1920.

To the Editors:

I read with much interest the article in the Sept. 25 issue of the ELECTRIC RAILWAY JOURNAL relating to labor-saving devices used in Cleveland for pole shifting. From the number of requests that are continually received by railway line departments for the shifting of trolley poles it might appear that most garages are located so that the entrance run will come just where a trolley pole will interfere with the ingress and egress of automobiles.

The amount of work that is necessary for shifting a pole surprises the uninitiated, who appear to think that it means merely the digging of a new hole and the lifting of the pole out of the old location and dropping it into the new one. A recent request asks, "Will you be kind enough to have one of your men remove this pole about 2 ft.?" The pole referred to was made of steel tubing and weighed approximately 1,000 lb., so that it would be quite a job for one man to move. Aside from the weight there were attachments of span wires, feeders and other equipment, all of which must be taken care of and proper permits obtained from city authorities for their change.

Another request which I have seen stated that the only wire attached to a pole which it was desired to have moved was a span wire and that the pole could be moved by the builder's own employees, if the railway would permit them to do so. Investigation showed that the pole also supported a side feed pipe leading from a manhole in the street, through which a tap was brought from the underground cable up to the trolley wire. This pipe had been entirely overlooked by the owner and the moving of the pole would have required a change in the route of the pipe which would have necessitated the opening of the street and the rerunning of the pipe, which was quite an expensive job.

The shifting of a pole seldom improves a line, in so far as the railway company is concerned, and frequently it weakens it if the new location is more than a few feet from the old one. The shifting usually lengthens the section on one side of the pole and shortens the one on the other, and also if a pole on one side of the street is moved and its mate across the street is left in place the result is a skew span, which may cause trouble if the angle between the span and the trolley wire is made too acute. In any case such a location is unsightly.

As the railway does not gain by the transfer of the poles to another location, it is usual to ask property owners to stand all of the expense of the work. It is usually very hard to convince owners of the justice of this claim and many appeals are made to aldermen or other city officials to try to have cost of transference borne by railways. In all cases that have come to the attention of the writer these appeals have been of little value, and eventually the company has been authorized by the owner to shift the pole at his expense.

On the railway with which I am most familiar the only time when poles are moved without charge to the person requesting the change is when the building is high enough to permit of the attachment of the span wire to an I-bolt set in the walls of the building and when the pole to be moved is not carrying any wires except those supporting trolley wire. In such a case the pole can be removed and used elsewhere by the railway company and the burden of painting and otherwise maintaining the pole counterbalances the cost of removal. In such cases it should be necessary, however, for the house or building owner to agree in writing to the attachment to the building and further to agree to reimburse the railroad company for the cost of putting the pole back in its original location if he should later insist on the removal of the attachments from the building.

Some railways have regular printed agreements covering all the points mentioned. In one of these the agreement asks the railway company to remove a pole and to attach the span wires to the building by means of an I-bolt or bolt fastened into the wall. In this case the property owner grants to the railroad company the right to attach and maintain during the life of the agreement its span wires attached to the I-bolt. This privilege is granted for the term of one year only, but continues in force thereafter until the owner secures from the city authorities the necessary permits for setting and maintaining trolley poles in substantially the same locations that are occupied by the poles which are removed, the expense of setting new poles and of transferring wires from the building to them being borne by the property owner.

The railway company agrees that the form and manner of attaching the span wire at the building shall at all times be subject to the approval of the property owner, that the railroad company will protect and idemnify the owner against any claims for damage or loss arising out of the use of walls of buildings as a support for its span wires, and that upon its abandonment of the use of the building the privilege of attaching shall cease.

Such agreements have been used in a large number of cases with entire satisfaction to both parties interested.

G. H. McKELWAY,
Engineer of Distribution.

Association News

October Compilations by Service Bureau

DURING October the bureau of information and service issued the following bulletins:

Jurisdiction of Public Utility Commissions Over Jitneys, a compilation of replies from secretaries of commissions, showing the extent of control, requirements for permission to operate and a brief summary of the regulations imposed in each case.

Methods of Fare Collection on Zone Systems, a tabulation of replies to Data Sheet 208 issued by the joint committee on collection and registration of fares of the Transportation & Traffic and Accountants' Associations.

Cost of Materials, a tabulation prepared by several manufacturers bringing up to date the information submitted by them before the Federal Electric Railways Commission.

Confidential Power-Cost Data, a tabulation of replies received to Data Sheet 197a issued by the power generation committee showing the following items for thirty-four power plants: output, peak capacity, load factor, pounds of coal and B.t.u. per kilowatt-hour, and segregated costs per kilowatt-hour covering fuel, labor, maintenance, etc., and in addition a brief description of equipment and facilities.

In addition to the above supplements have been issued to the bulletins on wages of trainmen, cost-of-living studies, cities which have increased rates of fare and lists of cities of over 25,000 having no fare increases.

New Zealand Railway Electrification

RECENTLY, according to the London *Electrician*, the English Electric Company was awarded the contract for the electrification of the section known as "Arthur's Pass" of the Midland Railway of New Zealand. At present all the railways in New Zealand are steam-operated, but it is proposed to electrify this connecting link between the government railway system of the east coast and west coast of South Island. The section to be electrified includes a tunnel more than 5 miles long and a 3 per cent grade to the summit, 2,400 ft. above sea level.

The system to be used is 1,500-volt direct current with overhead contact and the power will be generated directly by geared-turbine sets. It will be necessary to operate the boilers on dust fuel taken from neighboring mines whose product is too poor for ordinary consumption.

Transportation in Paris to Be Unified

THE Paris Municipal Council and the Conseil General of the Department of the Seine have acquired all surface transportation lines in Paris, France. These are to be paid for in annual installments. The transportation lines will not be operated directly by the municipality, but through the medium of an operating company, which will receive interest at 6 per cent, out of which the operating company must pay taxes. Provision is to be made, however, for a reward to the operating company for good management.

Recent Happenings in Great Britain

Meeting of Municipal Tramway Association Outstanding Event—London's New Fares in Effect

From Our Regular Correspondent

The nineteenth annual conference of the Municipal Tramways Association was held in Cardiff on Sept. 15 and 16. The meeting was occupied almost entirely with questions of finance—that being the dominant topic here as it is in America. Fares, working expenses, cost of renewals, depreciation funds and economics in operation all claimed attention. There was general agreement as to the troubles, but no sovereign remedy for them as a whole was forthcoming. The value of the conference lay rather in the exchange of views and in the detail suggestions put forward. The president was Sir John Courtis, chairman of the Cardiff tramways committee.

TRAMWAY fares were dealt with in two papers by Councillor Higham, chairman of Blackburn tramways committee, and P. Priestly, manager of Liverpool Corporation Tramways. The former contended that in most towns the time had arrived for the abolition of the penny fare and also for sweeping away cheap workmen's fare. Mr. Priestly pointed out that many towns had obtained powers to increase the statutory minimum charge from 1d. to 1½d. per mile. Every passenger should pay his share of the expenditure. The short distance passenger should pay more in proportion than the long distance passenger.

A. L. C. Fell, manager of the London County Council Tramways, dealt with power expenses. How to obtain economy with the poor quality of coal now available was one of his points. The better education of all employees in economical methods was another. He would like to see a scheme under which the staff and the employees would have a direct financial interest in the success of the undertaking. The employment of a fully qualified chemist to carry on tests of fuel, water, etc., at the power station, the payment of bonuses to motormen and conductors for reducing power consumption and the use of trail cars were other suggestions.

DEPRECIATION DISCUSSED

Two papers on repairs and depreciation in relation to capital and revenue were presented by James Dalrymple, manager of the Glasgow Corporation maintained intact. Mr. Horsfield also ager of Cardiff Corporation Tramways. The former insisted on the necessity of providing a full depreciation fund out of revenue for the purpose of paying for renewals, and also of keeping the undertaking in thorough repair. Otherwise capital could not be maintained intact. Mr. Horshfield also urged the need for a depreciation fund in addition to the ordinary sinking fund. The tendency of some authorities to borrow for renewals should be checked at its inception.

The future of capital expenditure was the subject taken by R. S. Pilcher, manager of Edinburgh Corporation Tramways. It was his view that the cost of permanent way had become so high renewals of tramway track where the traffic was light could not be carried out, but that motor omnibuses or the trackless trolley system should be substituted. Such vehicles also could be used for extensions.

MILKING THE MUNICIPAL COW

The various papers were discussed at length. On the question of fares it was pointed out that in the case of small undertakings, as the routes were short, if the fares were too high the people would walk. Other speakers complained that in many instances municipal tramways had been turned into "a milch cow" for the relief of the rates and consequently had become practically bankrupt. The necessity of educating the public to realize the depreciated value of the penny was also insisted on. An exhaustive analysis should be made of conditions so as to determine what each fare ought to be.

On the subject of working expenses, one gentleman who said that the tramcar was the cheapest vehicle to run was of the opinion that it could be made a good deal cheaper if as much scientific attention was devoted to its improvement as to the motor omnibus. In regard to depreciation funds, some members took the view that in cases where capital had been nearly paid off renewals should be carried out by means of new capital. One prominent manager thought that having regard to the present high cost of renewals the ideals of authors of the papers on depreciation would have to go, and that reborrowing would have to be considered.

G. W. Holford, manager of Salford Corporation Tramways, was elected president of association for the ensuing year.

LABOR DISPUTE SETTLED

In the middle of September a settlement was reached in a dispute which threatened to have a serious effect on many electric traction undertakings. A number of men, members of the Electrical Trades Union, employed in the works of Cammell Laird & Company at Penistone, Sheffield, had struck work on the ostensible ground that one of the foremen was not a member of their union. Many foremen, however, are not members of the men's unions, and the real reason for the suspension seems to have been that this foreman had engaged some men who were not members of the union. The employers refused to give way on a question of principle and as the strike was persisted in the Engineering Employers' Federation issued lock-out notices applicable to numerous works throughout the country. The men's union then threatened to call out their members employed in electric generating stations. The National Joint Industrial Council for the Electricity Supply Industry was called on to inquire into the subject, but after it had met the men's union withdrew objection to the Penistone foreman. Then the employers withdraw their lock-out notices and soon peace reigned.

SHORT-HAUL FARE REVIVED

The increased fares on the London underground railways, the London County Council Tramways and the London General Omnibus Company's 'buses came into operation on Sept. 26. In all cases the new fares are above a penny a mile for short distances, but under that rate when the distances get up to 4 or 5 miles or more. A novelty, or rather a revival, on the tramways is the 1½d. fare, but now it covers only 1.2 miles, or less than half of what it did in pre-war days. As the result of the failure to come to an agreement (to which reference was made last month) between the County Council and the Omnibus Company, the latter on Sept. 27 inaugurated a 2d. midday fare for any distance (above minimum) within the tramway area so as to compete with the corresponding fares on the cars. These fares are in force only during the slack hours (10 a.m. till 4 p.m.), and they do not apply on Saturdays, Sundays and holidays. The company promises to give them a trial, to publish figures giving the exact results, and to challenge the County Council to produce its figures for comparison. The minimum ordinary fare on the underground railways and the omnibuses is 1½d., and a suggestion has been made for minting a halfpenny coin.

FARE INCREASE RESULTS APPARENT

Some results of the increase of fares were issued early in October. They related to the first complete week after the increases came into operation. On the railways the increase in fares averages 30 per cent, while the increase in traffic receipts was 25 per cent. On the omnibuses the fares were increased 25 per cent and the receipts for the week were up by 14 per cent. The difference is ascribed to a slight falling off in the number of passengers and to the passengers riding shorter distances. In the case of the London County Council Tramways the average percentage increase of fare is not stated, but the traffic receipts rose by 29 per cent.

An interim report by the Electrification of Railways Advisory Committee was issued on Sept. 30. The report, which is dealt with elsewhere in this journal, makes important recommendations as to future electrification, among them being that methods and appliances should be standardized and that the direct-current system at a pressure of 1,500 volts should be used.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Mending Mexico's Muddle

Committee Representing Bondholders Confers with Mexican Authorities—Properties Returned to Owners

Many matters outstanding between the Mexico Tramways and its affiliated companies and the government of Mexico are now under discussion with a view to reaching a settlement as quickly as possible. The electric railway in Mexico City was returned to its owners by the government last May. When the lines were handed back no indemnity was paid for their occupation for the period of more than four years. The present negotiations, it is believed, have given rise to the rumor noted in the ELECTRIC RAILWAY JOURNAL for Oct. 2, page 685, that the government planned permanently to municipalize the roads.

Since the return of the tramways the lines have been operated by the company with the end in mind of restoring the tracks and cars to proper operating efficiency as rapidly as possible. No funds were available for this purpose except such as were received from the gross earnings, but already much has been done in the way of improvement.

MORE REVENUE NEEDED

Owing to the continuous rise in the cost of living, it was necessary on several occasions to advance the wages of the employees of both the tramway and the light and power companies. In the case of the tramway an advance was made in fares, but it has not been possible so far to complete arrangements to increase these sufficiently to compensate the company for the advance in wages and general rise in the cost of materials. If the company is to pay its way, therefore, it will be necessary to establish a new scale of fares. It is hoped that a solution of the difficulty will be reached before long. The taxation of the companies, the payment of large sums owing to them by the government and various other important matters are also under discussion.

It is hoped that early in the new year the committee which represents the bondholders of the several properties will be in a position to make a report to the security holders with full information as to the financial position of the companies and what funds will be available for meeting their obligations. The committee will at the same time make such recommendations to the bondholders as they think will best serve their interests. Meanwhile, a firm of chartered accountants is working on the accounts with a view to establishing the exact financial position of each company. The report of these accountants should be completed soon and will enable the committee to determine what terms of settlement can be recommended to the bondholders.

E. R. Peacock, chairman of the committee representing the bondholders, and H. Malcolm Hubbard of the committee visited Mexico City last spring immediately after the revolution. Declarations of policy made at that time by those in authority were taken to indicate an improvement in the attitude of the former government and would seem to justify the statement that things are better in Mexico.

$5,000,000 Improvement Program

A $5,000,000 extension program for 1921 has been announced by G. J. Kuhrts, general manager of the Los Angeles (Cal.) Railway. The expenditure will cover new cars, a new division carhouse, new substations and extensive reconstruction of tracks and pavement. Recommendations of the State Railroad Commission of California will be followed throughout.

Reconstruction of track and purchase of track equipment will involve $1,600,000. Renewal of overhead equipment will take $300,000. A substantial investment will be made in new cars, but the exact amount and number of cars have not been definitely decided upon.

Four new substations are to be constructed at a cost of $500,000. One of these substations is to be built in the district which will benefit by a tunnel, giving another outlet from the congested district at Second and Hill Streets. Half a million dollars is to be spent on a new carhouse.

In addition to the expenditure for bettering railway service, the Los Angeles Railway has under way a $200,000 home building program for employees. The construction of the first homes has been started.

The Los Angeles Railway has made three important moves in the year now nearing a close: First, the rerouting of all lines last May to give economies recommended by the State Railroad Commission. Second, the installation of safety car service. Third, the application for increased fare. Los Angeles held to a 5-cent fare to the last, but the application for increase finally became necessary to make revenue meet operating costs. At this writing the commission has not given a decision, although Richard Sachse, its chief engineer, recommended in favor of a 6-cent fare and continuation of the safety car program. The railway operates approximately 775 cars a day.

New Publicity Committees

Ohio and Missouri Utilities Organize Committee to Spread Information and Educate the Public

Committees on Public Utility Information, patterned after the Illinois plan, have been organized in Ohio and Missouri. The Ohio committee will have offices at 901 Illuminating Building, Cleveland. It has engaged as director Benjamin E. Ling, a newspaper man of wide experience. The chairman of the committee is W. W. Freeman, president of the Union Gas & Electric Company, Cincinnati.

Among the railway men on the committee are the following:

Walter A. Draper, vice-president of the Cincinnati Traction Company; Col. J. H. Alexander, vice-president of the Cleveland Railway; L. J. Wolf, vice-president of the Cleveland, Southwestern & Columbus Railway.

COMMITTEE IN MISSOURI, TOO

These, of course, are only the railway men on the committee. There are some ten other members serving on that body representing the electric light, gas and other utility interests, all these men being executives of important companies.

The Missouri Committee on Public Utility Information will be conducted under the direction of the Missouri Association of Public Utilities with headquarters at 3725 North Broadway, St. Louis, Mo. The personnel of this committee is as follows:

E. D. Bell, general superintendent of the Illinois Traction System (Missouri properties), chairman; F. G. Buffe, general manager of the Kansas City Railways; H. Wurdack, general manager of the Light & Development Company, St. Louis; J. H. Horgan, general manager of the Empire District Electric Company, Joplin; W. J. O'Connor, assistant to president of the Southwestern Bell Telephone Company, St. Louis, and Wiley F. Corl, general manager of the Mexico Light & Power Company.

MANY SIMILAR BODIES

With the completion of these two new committees there are now organizations actively at work for the purpose of disseminating information about the utilities in Illinois, Indiana, Kentucky, Nebraska, Ohio, Oklahoma, Arkansas and Missouri. Wisconsin and Michigan have formed committees which expect to become active as soon as the election is over. In New York, Iowa, Texas and several other states definite steps have been taken looking toward similar action.

Utilities a Political Issue

They Are Dragged Into Campaign on One Pretext or Another in Many States

In only a few cases were railway issues involved directly in the results recorded at the polls on Nov. 2, but in a number of other instances the decisions made by the electors will probably have an important bearing on the future of public service properties. Perhaps the most important issue before the voters of a single community was the franchise proposal in Toledo, Ohio. Both service-at-cost and municipal ownership measures were submitted in that city. As noted at length elsewhere in this issue, the city adopted the Milner service-at-cost plan of settlement.

5c. Car Fare Is Enough

Engineers who have studied the subject for Mayor Thompson's Traction Commission testify that the street cars of Chicago can be run at a profit on a 5-cent fare.

The traction companies and the commercialized newspapers who aid them and lie to you are trying to fool you into voting against candidates who, if elected, will give us a 5-cent fare.

Will you—who must pay extra fare every time you get on a car—will you let the traction barons and their camouflaged "non-partisan" Democrat agents fool you into voting against yourself?

Len Small, the Republican nominee for Governor, is pledged to put an end to the Public Utilities Commission which permits the traction barons to boost fares in violation of contracts, and to gouge the car-riders every night and morning.

Don't be fooled by the tools of the traction barons into voting against yourself.

Vote for Len Small for Governor

(See Other Side)

Do You Want 5c. Car Fares?

Tomorrow, every man and woman voter has the opportunity to vote for the restoration of 5-cent car fares. If the people do not so express their desire for 5-cent fares, then car fares will be further increased to 10, 12 and 15 cents!

You will vote for men who will give you 5-cent car fares or for men who will help increase car fares.

The Governor, who will be elected tomorrow, will sign or will veto the bill passed by the Legislature, giving the people the power to adopt 5-cent car fares.

Len Small, the Republican nominee, if elected, will sign the bill. The Democratic candidate is against a 5-cent fare and would veto the bill.

Later the County Judge will decide whether or not to put the question on the ballot so the people can vote on it. Frank S. Righeimer, the Republican nominee, if elected, will put the question on the ballot, because he has been and is fighting for 5-cent car fares.

The State's Attorney is the official who can prevent the traction barons from defeating, by boodle, the Thompson Traction Plan for 5-cent car fares when it is submitted to the vote of the people. Judge Crowe, the Republican candidate for State's Attorney, has fought consistently for the Thompson Traction Plan for 5-cent fares, and, if elected, will not permit the sinister interests that have gouged the people for the last four years to continue to cheat you through bribery of public officials.

Republicans should vote the Republican ticket straight. Democrats, Socialists and Independents, who want 5-cent car fares, should mark a cross in the square before the names of each of the following candidates:

For Governor

[X] LEN SMALL

For County Judge

[X] FRANK S. RIGHEIMER

For State's Attorney

[X] ROBERT E. CROWE

(See Other Side)

ANTI-RAILWAY CAMPAIGN CIRCULARS DISTRIBUTED TO CHICAGO VOTERS

In Illinois candidates have been elected to office whose campaign pledges may result in conditions very detrimental to the best interests of the people of the State and particularly of Chicago. There was widespread objection to the methods and propaganda of the Mayor Thompson political machine, which in this election spread its activities from the city of Chicago to include the entire State. In consequence more than 300,000 people are said to have scratched their ballots and voted for democratic state and local candidates in order to defeat the Thompson republican candidates. Nevertheless, the avalanche has carried into office Len Small for Governor, and all of the other Thompson candidates.

The nomination and election campaign pledges of Mr. Small, working with the Thompson machine, were for the abolition of the Illinois Utilities Commission, the passage of laws making home rule and municipal ownership possible, and the restoration of 5-cent fares. So far as the activities of the Thompson machine were concerned, these three planks were the mainstays of the campaign platform. The accompanying illustration gives an idea of the spurious literature with which the people of Chicago have been flooded during the campaign. The Thompson machine candidates for County Judge of Cook County and State's Attorney in Chicago were also elected. The only success in the state against the Thompson machine was the nomination and election to the United States Senate of William B. McKinley, president Illinois Traction System and United States Congressman.

In New York State both the Republican and the Democratic parties had planks in their platforms dealing with the utilities. The Democratic platform put the party on record as opposed to legislation permitting state commissions to impair or modify contracts fixing rates of fare made between cities of the State and the railways. It was charged by the party that measures violating this principle were advocated by a Republican Speaker of the Assembly in 1919 and 1920. On the other hand the Republican platform proclaimed that there had been no efficient regulation of utilities; that the transit systems had disintegrated; that lines had been abandoned; that nothing had been accomplished for the public benefit, and that none of the pre-election promises of the Governor had been fulfilled.

In his speeches Governor Smith, elected by the Democrats two years ago, said that municipal ownership was the only solution of the transit problem and that such ownership was bound to come in New York and other large cities of the State. In the campaign taking points were made by the Republicans of the changes made in the Public Service Commission at the behest of Governor Smith, and by the Democrats of the alleged record of corporation activities of Judge Nathan L. Miller, Mr. Smith's Republican opponent. Judge Miller was elected over Mr. Smith by a small plurality.

Removal of Commissions Rebuked

In New Jersey the utilities were dragged into the campaign through the recent removal of the members of the Board of Public Utility Commissioners by Governor Edwards. There the election was a congressional one. Republicans captured all of the seats except one. Their victory is regarded as a rebuke to Governor Edwards, who campaigned for a Democratic legislative body to uphold him in his ousting of the members of the utility board. He is attempting to replace these members with a Democratic board. The Republican Senate has failed to confirm the new appointees. Mr. Edwards urged the voters to wrest the legislative control from the Republicans and give it to the Democrats. The bill was approved providing an appropriation for the vehicular tunnel under the Hudson River between New York and New Jersey.

In Rhode Island the Democratic candidate for Governor, Edward M. Sullivan, who was defeated, sought to make an issue out of the affairs of the Rhode Island Company He advocated the acquisition by the State of all the electric railways and their operation by the State through a special corporation chartered for that purpose.

Citizens of San Francisco had before them a charter amendment to provide an enabling act to make it possible to submit to the voters a proposition to acquire the United Railroads. It is believed that the amendment was approved. It required only a majority vote to carry the amendment, but in the matter of issuing bonds to finance any proposal for taking over the United Railroads a two-thirds vote will be necessary.

Residents of Pasadena, Cal., voted against building a municipal electric railway between Los Angeles and Pasadena to compete with the Pacific Electric Railway. This is the second time within a year that the plan has been defeated.

Increase Again Denied

Seattle's Mayor Again Points Out How Impossible It Is to Increase Municipal Railway Wages

Mayor Hugh M. Caldwell of Seattle, Wash., has advised the representatives of the trainmen of the Seattle Municipal Railway that he will not confer with them on the matter of wage increases. The request of the men, if granted, would cost the city $500,000 a year.

The representatives of the union recently requested the Mayor to confer with them on a proposed wage increase. In reply, Mayor Caldwell advised them that they had become civil service employees, and enjoyed no special rights as city employees by reason of their union membership. He also pointed out that the railway department has no power to enter into a contract with a union, and that requests for wage increases must go before the City Council.

SEVENTY-FIVE CENTS AN HOUR ASKED

Surprise was expressed by the Mayor at the men's request, in view of the fact that the railway is about $500,000 in the hole, aside from depreciation charges. Mayor Caldwell called attention to the fact that a letter addressed to the budget committee of the Council on July 20 of the present year requesting an increase in pay indicated that the trainmen recognized the fact that they were civil service employees, and subject to civil service regulations. The request of last July was denied. The Mayor reiterated the fact that no other officials of the city government have any authority to grant any increase of pay to city employees.

Mayor Caldwell referred the application for increase to D. W. Henderson, superintendent of railways, who submitted an estimate, based on figures for August of the present year, showing that expenses would amount to $496,615 annually if the city should grant the advance requested. An increase of pay to 75 cents an hour would amount to an advance of 11.7 per cent over the present scale.

Mr. Henderson pointed out that wages of trainmen have increased 64 per cent to 80 per cent over those paid on Jan. 1, 1918. The Mayor also called attention to the fact that trainmen are now receiving two weeks' vacation, with pay, a privilege not granted under private management. This alone is costing the municipal railway approximately $100,000 a year.

Voters Approve Service at Cost

City of Toledo and Railway Will Now Proceed to Put New Arrangement Into Effect

Toledo adopted the Milner service-at-cost plan of street railway settlement and turned down an anomalous municipal ownership proposition by a vote of nearly three to one at the election on Tuesday. There were 45,990 votes in favor of the service-at-cost measure and 18,029 against. This is the first time that a constructive street railway measure ever won out in Toledo and it is also the most decisive vote on any referendum ever submitted to the people.

THE election assumed national importance on account of the interest taken in the long years of struggle over the railway question in Toledo and because women were to express themselves for the first time on traction questions.

The returns by precincts show that the women are largely responsible for the tremendous majority given the Milner plan. In the Seventh Ward where women were registered in a larger percentage to men than any other, the franchise ordinance passed almost unanimously.

The municipal ownership twin bond ordinances were defeated by wider margins. The first one, ostensibly to provide $3,000,000 bonds for the purchase of buses for auxiliary service to the railway system, was defeated by a vote of 16,469 in favor and 46,369 against. The second municipal ownership ordinance, purporting to provide $4,000,000 through bonds for constructing lines, was defeated with 17,780 votes in favor and 43,125 against.

The drubbing handed to the *News-Bee*, a Scripps-McRae newspaper, was complete. It campaigned against the railway ordinances and individual candidates in the elections and was rebuked for its years of fighting against the Toledo Railways & Light Company.

Frank R. Coates, president of the Rail-Light, expressed satisfaction with the returns and declared that the company would proceed with improvements and additions to many other departments of its business.

The ordinance will probably accomplish its task of providing service-at-cost to the Toledo patrons within the next ninety days. That is the period allowed for the acceptance by the Toledo Railways & Light Company and the Community Traction Company, created by the measure.

This acceptance has been agreed upon by the directors of both companies and a written copy of it filed with Mayor Cornell Schreiber last August.

The matter of making the ordinance a binding contract on both the city and the railway is now only perfunctory.

A fare of 6 cents cash and 1 cent for a transfer is provided for in the ordinance. This will go into effect and reduce fares and transfers each a cent when the cost-of-service plan begins to operate. The fares will remain this way for six months, after which time they will be regulated by the amount in the stabilizing fund. The company will be asked to furnish $500,000 as working funds to put the measure into effect.

The next move will probably be the appointment of a board of control to consist of three members—one for two years, one for four years and one for six years. All others shall be appointed at the end of these terms for six years.

On recommendation of this board the Mayor will also appoint a railway commissioner who will represent the city in the operation of the system. The board will fix his salary and appointments of assistants will be subject to its approval.

One of the first duties of the board of control will be to study a plan for re-routing the present car lines and making plans for a crosstown line. The company has agreed to furnish an additional $1,500,000 for these changes.

The return to the Community Traction Company shall be based upon the valuation of $8,000,000 and the bonds representing this amount will draw 6 per cent return. All additional financing shall be by preferred stock which will yield 9 per cent.

The plans voted on Tuesday were prepared under a settlement plan brought forth by Judge John M. Killits of the federal court at Toledo following the bringing of the cars back to the city after the famous "ouster" of a year ago.

The progress made in educating the public of Toledo is indicated by the change from a favorable vote on eliminating of street cars a year ago next Tuesday to an overwhelming vote in favor of a franchise last Tuesday.

Both the city and the company will make active arrangements to put the plan to work.

Charter Amendment Probably Passed

Although final returns on charter amendment thirty at San Francisco, Cal., were not expected to be in until Nov. 4, it was the opinion on Nov. 3 that the amendment had carried, probably by a two to one majority. This amendment provides a simple method whereby city officials can agree with utility officials on the price and terms for taking over a property and then submit to popular vote for ratification any proposal for the purchase of a utility. Amendment thirty and the ratification procedure it proposes both require only majority votes to carry. At present San Francisco has no authority to agree with any utility on the purchase price of a utility except after a bond issue for the express purpose has been carried. Such bond issue requires a two-thirds vote. No direct proposal for the purchase of the United Railroads was voted upon.

News Notes

Advance for Sacramento Employees.—Platform men of the Pacific Gas & Electric Company, Sacramento, Cal., have been granted an increase of 4 cents an hour and shop employees have been given a rise of 9 cents flat. The motormen and conductors have been receiving 47, 49 and 51 cents an hour. This is the second wage advance by the company within a year. The last one took effect in May.

Voters Defeat M. O. Plan.—Residents of Pasadena, Cal., voted on Nov. 2 against building a municipal electric railway between Los Angeles and Pasadena to compete with the Pacific Electric Railway. This is the second time within a year that the plan has been defeated. The vote was practically five to one against the plan, returns from forty-five out of seventy precints giving 2,215 in favor of the proposal and 5,561 against it.

Order for Arbitration Ignored.—Gaylord Thompson, general manager of the New Jersey & Pennsylvania Traction Company, Trenton, N. J., has sent a communication to the City Commission of Trenton stating that his company will not arbitrate the recent trouble of the employees. The company says the motormen and conductors who went on strike have been discharged and that the city's order for arbitration at this late date will be ignored.

Receiver Plans Collective Bargaining.—Lindley M. Garrison, receiver of the Brooklyn (N. Y.) Rapid Transit Company, made public on Oct. 30, a letter received by him from Federal Judge Mayer urging that his promise to Mayor Hylan that the right of collective bargaining between the company and its employees be carefully safeguarded, and Mr. Garrison's reply to the effect that a plan of co-operation was being prepared and would shortly be submitted to the court. It has been reported that the employees are engaged in creating a brotherhood similar to that of the employees of the Interborough Rapid Transit Company.

Object to Rebuilt One-Man Cars.—The local of the Amalgamated Association at Boston has announced that a communication has been sent to William D. Mahon, president of the Amalgamated Association, urging him to come to Boston to discuss the friction between executives of railway systems and the unions over the double-truck one-man cars. Some time ago the wage conference board of the union of employees of the Eastern Massachusetts Street Railway sent a similar request to Detroit, the headquarters of the International, in which it was pointed out that the men of that system were in open revolt against the one-man cars in some of the cities and towns through which the Eastern Massachusetts Street Railway operated.

New Orleans Men Sign.—J. D. O'Keefe, receiver of the New Orleans Railway & Light Company, New Orleans, La., and James Rodgers, representing the local division of Amalgamated Association, on Oct. 21 signed a contract under which the men will be paid at the rate of 49, 52 and 55 cents an hour. The agreement is to stand until July 1, 1922, the wage scale being subject to further revision on July 1, 1921. By the terms of the contract the men are barred from striking to enforce demands for higher pay. The new wage scale represents an increase of 25 per cent over the former rates, and was recommended by the special masters who arbitrated the dispute between the company and its employees following the strike of last July. Payment of the new rates began on Oct. 21.

Housing Plan Progressing Satisfactorily.—Nearly 300 applications for participation in the housing plan of the Los Angeles (Cal.) Railway have been filed by employees. The majority ask the company to purchase a lot and build a house. The other proposals offered are that the company build a house on land owned by an employee or that the company finance the purchase of a house and lot selected by an employee, or that the employee rent a house built by the company. Twenty-five cases have already been handled and work on the first seven bungalows has been started. To guard against speculators offering to help an employee complete the payment on a home and then re-sell it to some one outside the company, it is stipulated that the deed shall not pass from the company to the employee within five years. Payments for houses are arranged like rent. The maximum period for buying a house is fourteen years.

Favor Illinois Utilities Commission.—The Illinois Committee on Public Utility Information has just printed an interesting page containing thirty-eight excerpts from various Illinois newspapers on so-called "Home Rule" in Illinois. Editors have given much space in their papers of late to the proposal recently discussed in the large cities of Illinois that all public utilities should be ruled by individuals and not governed by Public Utilities Commission. From the tenor of the editorial comment on this reprint sheet it would appear that the Illinois Public Utilities Commission has the backing of the public. An editorial from the Rockford *Star* pertinently sums up the situation. It says, "The apostle of 'Home Rule' does not say that the public utility commission idea, which he now denounces, came into force because 'Home Rule' failed." The page also contains seven editorials from Iowa newspapers which voice the sentiment that Iowa needs a Public Utilities Commission to bring about the necessary adjustment in the present utility field in that State.

Programs of Meetings

Association of Terminal Engineers

At a meeting to be held in New York City on Nov. 9, at the United Engineering Society's Building, Col. J. C. Bonner, inventor of the "Bonner Rail-Wagon System," described in the issue of this paper for Oct. 12, 1918, will speak on "Twentieth Century Freight Handling."

National Municipal League

At the twenty-sixth annual meeting of the National Municipal League, which will be held in Indianapolis Nov. 17-19, the session on the morning of Friday, Nov. 19, will be given up to the topic "Service-at-Cost for Street Railways—Panacea or Nostrum?" This meeting will be a joint session with the Municipal League of Indiana. The program for this meeting follows:

Cincinnati—"Service-at-Cost and the Sliding Scale."

Cleveland—"Service-at-Cost and Efficient Management," Fielder Saunders, Street Railroad Commissioner, Cleveland, Ohio.

Boston—"The State Trustee Plan," James F. Jackson, chairman of the Public Trustees of the Boston Elevated Railway.

Indianapolis—"Indianapolis and the Five-Cent Fare," E. T. Lewis, chairman Public Service Commission of Indiana.

"Service-at-Cost or Municipal Ownership?—Seattle's Experience," Charles M. Fassett, ex-Mayor of Spokane, staff member of American City Consultants.

Central Electric Railway Association

The fall meeting of the Central Electric Railway Association will be held at the Claypool, Indianapolis, on Dec. 2 and 3. There will be a meeting of the executive committee at 9 a.m. on Dec. 2. The business session will convene at 10 a.m. Reports of committees will be presented. There will be an address by James P. Barnes, president of the Louisville Railway. No formal subject for the address has been assigned. The association will reconvene at 2 p.m. The following papers will then be presented:

"Publicity," Bernard J. Mullaney, manager of the Public Relations Department of the People's Gas, Light & Coke Company, Chicago, Ill.

"Co-operation," W. L. Goodwin of the General Electric Company, Schenectady, N. Y.

On Dec. 3 the association will convene at 9.30 a.m. The following papers will be presented:

"Public Relations," Martin J. Insull, president of the National Electric Light Association, Chicago, Ill.

"Accident Prevention," Charles B Scott, general manager of the Bureau of Safety, Chicago, Ill.

There will be general oral discussion on all papers by the members of the association. On the night of Dec. 2 i is planned to hold a theater party.

Financial and Corporate

Changes at Youngstown

Financial Readjustment Disclosed by Announcement of Offering of $13,000,000 of New Securities

Announcement made by the banking syndicate handling the $13,000,000 issue of Pennsylvania-Ohio Power & Light Company's first and refunding mortgage 7½ per cent sinking fund gold bonds discloses changes in the scheme of organization of the public utilities properties centering at Youngstown, Ohio. The proceeds of the bonds now being offered together with the proceeds of $4,050,000 of junior securities will provide for the retirement of $12,522,000 of first and consolidated mortgage bonds of the Mahoning & Shenango Railway & Light Company due on Nov. 1, 1920; will provide for the retirement of floating and guaranteed debts, and will furnish sufficient working capital for the new company. Upon completion of the financing the Pennsylvania-Ohio Power & Light Company will have no debt other than the funded debt shown in the accompanying table of capitalization.

NEW COMPANY FORMED

The Pennsylvania-Ohio Power & Light Company has been incorporated to take over the electric power and light business of the Pennsylvania-Ohio Electric Company. The latter company owns the entire common stock of the Pennsylvania-Ohio Power & Light Company except the directors' qualifying shares. The territory served is within an area of about 600 square miles in Pennsylvania and Ohio midway between Pittsburgh and Cleveland. There are twenty-five municipalities in this territory, including the cities of Youngstown, Warren and Niles in Ohio and Sharon in Pennsylvania. The population served is in excess of 300,000.

The electric railways comprise 59.13 miles of single track. Of this mileage 49.35 miles is interurban, of which approximately 40 miles is on private right-of-way. There are 218.5 miles of new high voltage electric power transmission lines and extensive distribution lines in Youngstown, Gerard and Struthers, Ohio; Sharpsville, Farrell, Ellwood City and Sharon, Pa., and the vicinity.

CAPITALIZATION

(Upon Completion of Present Financing)

Funded Debt		
Underlying divisional 5 per cent bonds (closed mortgages)	$1,989,000	
First and refunding mortgage 7½ per cent sinking fund gold bonds (this issue)	13,000,000	
		$14,989,000
Ten year 8 per cent secured gold notes, due Nov. 1, 1930†		2,250,000
Capital Stock:		
Preferred stock, 8 per cent cumulative		1,800,000
Common stock		6,000,000*

* Application for the issuance of $4,000,000 additional common stock is pending before the Public Utilities Commission of Ohio

† To be secured by $3,375,000 general mortgage bonds, due Nov. 1, 1930 (junior to the first and refunding mortgage bonds).

Upon the completion of the present financing the capitalization will be arranged as indicated in the accompanying table.

The bonds now being offered will be part of an authorized issue of $75,000,000 dated Nov. 1, 1920, due Nov. 1, 1940, of which in addition to the $13,000,000 present issue $1,989,000 will be reserved to be issued to retire outstanding underlying bonds, par for par, and the remainder will be issued for not more than 75 per cent of the cost of additional property and of future additions, extensions, or improvements to the properties of the Pennsylvania-Ohio Electric Company or its subsidiaries under well defined restrictions as to earnings. The bonds will be issued in series bearing interest at such rate or rates as the board of directors may determine. The bonds of the present issue will be designated as series A and bear interest at the rate of 7½ per cent per annum. An annual sinking fund will be provided for the first and refunding mortgage bonds accruing from Nov. 1, 1921, payable semi-annually, of 1 per cent per annum to Nov. 1, 1930, of the total amount of first and refunding mortgage bonds issued and 1½ per cent per annum thereafter to maturity. Bonds so acquired for the sinking fund are to be canceled and not reissued.

EARNINGS FOR YEAR ENDED AUG. 31

Gross earnings	$4,682,852
Operating expenses and taxes	2,705,789
Net earnings	$1,977,063
Annual interest charges on first and refunding mortgage sinking fund bonds now offered and underlying divisional mortgage bonds	1,074,450
Balance	$902,613

The bankers include in their summary of the activities of the company the accompanying statement of earnings of the property to be owned or controlled by the Pennsylvania-Ohio Power & Light Company for the year ended Aug. 31, including the total present annual interest charges, interest on the first and refunding mortgage sinking fund bonds now offered and underlying divisional mortgage bonds.

$10,604,268 Original Cost

Commission Reporting to the Tennessee Body Agrees Upon This Amount as Value of Railway Property

The joint report on the appraisal of the property of the Nashville Railway & Light Company, Nashville, Tenn., made for the Railroad & Public Utilities Commission of the state by Ross Harris, representing the city, Robert M. Feustel, representing the company, and Albert S. Richey, representing the commission, was submitted to the commission on Oct. 28. The appraisers definitely agreed upon every matter.

FINDINGS REVIEWED

The engineers found that on the original or historical cost basis the amount invested in the property of the company, including superseded property, was $14,828,536, of which $10,604,268 was in the railway department and $4,224,268 was in the light department and subject to the treatment of superseded property. They believe this the amount entitled to a reasonable return. Exclusive of superseded property the investment was $11,672,886, of which $8,101,413 was in the railway department and $3,571,473 in the light department. On the reproduction cost basis, using prices current during the first six months of 1920, the amount was $19,936,593, of which $13,672,679 was in the railway department and $6,263,914 was in the light department.

The amount of cash paid in by the security holders of the present company for stock and bonds issued at the formation of the company on July 1, 1903, was estimated at $4,316,776. At the same time the company assumed underlying securities to the amount of $2,577,000. Property additions, as shown by the books of the company, between the formation of the present company on July 1, 1903, and up to April 1, 1920, the date of the present appraisal, amounted to $7,225,023. The total of these three amounts, $14,118,798, therefore, very closely approximates the actual cash investment of the present owners and bondholders.

TWO BASES USED IN APPRAISAL

In accordance with the expressed wishes of the members of the commission appraisals were made on two bases, described as follows:

1. An original or historical cost appraisal. This was on the same basis as the 1919 appraisal of the property of the Memphis Street Railway. Wherever it was possible to ascertain the actual costs of parts of the property such amounts were used. Wherever the records of the company failed to show the actual costs of any parts of the property, estimates were made of the costs of such parts as of the dates of installation, in so far as such dates could be determined or approximated. This appraisal includes allowances for superseded property, which has not been amortized through income, and other uncompensated losses or costs incurred in building up the business.

2. A reproduction cost appraisal, using prices current during the first six months of 1920. This appraisal does not include superseded property, but makes a deduction for accrued depreciation, or "lack of newness," and an addition for going value.

Each of the appraisals was made on an inventory of property as existing on April 1, 1920. In both cases the value of the property was separated as between that used for the conduct of the railway business and that used in the lighting and electric power business.

Ten years, practically covering the electrification and the immediate subsequent rebuilding which was made necessary by the very rapid progress in the art, was taken as representing the development period. The accumulated deficit for the first ten years shown amounted to $502,406. That amount, therefore, was included as part of the investment. Seven per cent was used in the calculation of the deficit, in the belief that such was a fair rate of return on money invested in electric railway property during the development period. It is expected to review the findings of the appraisers in detail in an early issue of this paper.

Receivers in Charge in Kansas City

Messrs. Fleming and Wilson Qualify for Office and Continue Previous Management—Colonel Kealy Tenders Resignation

Colonel Fred W. Fleming and Francis M. Wilson, appointed receivers for the Kansas City (Mo.) Railways, on Oct. 26, took charge of the property Thursday morning, Oct. 28. The receivers had qualified Wednesday. Their first official act was to issue an announcement stating that all employees of the company would continue in their present duties. P. J. Kealy, president of the company, tendered his resignation. The receivers did not act on the resignation and it is in abeyance. Colonel Kealy is continuing to perform practically the same duties as before, with the receivers functioning as operators of the property. F. G. Buffe continues as general manager, and the other officials in their respective positions.

THE board of control—formerly consisting of President Kealy, representing the company, and E. M. Stayton, representing the city—ceased to exist as a functioning entity with the appointment of the receivers. Judge Stone said in court that this board seemed to be eliminated, since the authority of the court could not be delegated. The receivers are now of the opinion that the office and engineering facilities and machinery of the board of control, as well as the personal services of Colonel Stayton, will be essential to them in the operation of the property. It is said that Colonel Stayton will therefore be retained, in some capacity.

SPECIAL COUNSEL NAMED

James E. Goodrich has been appointed by the court to be counsel for the receivers. Judge Goodrich is especially prominent as counsel for banks and corporations. He is attorney for the Federal Reserve Bank of this district. The appointment of Mr. Goodrich had special interest locally, as offsetting intimations that the receivership had political color. Mr. Wilson and Colonel Fleming are both Democrats. They both are friends of Senator James A. Reed. Mr. Goodrich is a Republican.

The announcement by Judge Stone of his selections for the receivership caused surprise among the attorneys and interested parties. Several nominations had been made, the nominators explicitly denying any purpose to seek to conserve any special interest. Attorneys present had also spoken in behalf of the appointment of a local man or local men to the work. It was known in various circles that certain men were being urged for receivers. There was the usual amount of gossip as to the probabilities. The name of Francis M. Wilson had been mentioned in these prophecies, but Colonel Fleming's name had not.

Judge Stone, opening the Tuesday session with the announcement of his selections, said:

> Men should be put here that the court thinks are eminently fitted for the responsibilities and qualified to meet the problems of this company. Those problems are both business and legal. The court has tried therefore to select a business man of successful experience, and an attorney of wide experience.

Colonel Fleming was named first. In his selection the court as well as the parties in interest recognized the need of business experience in the receivership. Mr. Wilson was added in the creation of the receivership to provide intimate assistance and co-operation, incidentally of a legal nature, to Mr. Fleming.

A few hours after their appointment, the receivers issued a statement to the public, prepared by Colonel Fleming, as follows:

> The court has been compelled to take charge of the street railway property because the company cannot pay its debts and because the railways system must be maintained to protect the property and assure these cities a necessary means of transportation. In a matter of such great importance to the property owners and to the public, the receivers invite and should receive the cordial co-operation of every public spirited citizen. While the unfortunate financial condition of business will necessarily limit what the receivers can do, it is their purpose to furnish the best service possible to the public under these circumstances.
>
> As soon as they have had opportunity to familiarize themselves with the situation, the problems which involve the property and which involve the public will be fairly and carefully considered and determined.
>
> The appointment as receivers came without solicitation, directly or indirectly, and the receivers consider their selection as a call to public service. They are both disinterested, except as officers of the court, performing a public service, and are so situated at this time that they can give their undivided attention to the discharge of these duties so highly important to the welfare of Greater Kansas City.
>
> They are both sincerely grateful for the confidence reposed in them by Judge Stone, and their sole purpose will be to aid him in the proper administration of this sacred trust.

Following the appointment, various matters were taken up with the court, by parties having interests. One of these concerned taxes due and unpaid, or soon to become due, or in controversy. Nearly $500,000 in taxes must be paid this year, it was stated. The status of the tax claims was debated.

SETTLEMENT OF BILLS BEFORE COURT

It was pointed out that personal taxes unpaid do not become a lien until after judgment; that some of the unpaid taxes are in controversy, and even if not paid will not involve a penalty. The volume of taxes yet to be paid for this year was of interest because their amount had a bearing on the time within which bills unpaid or accruing could be met by the receivers.

At the previous hearing, Oct. 21, William C. Michaels of the law firm of Haff, Meservey, German & Michaels, representing specifically the General Electric Company, had presented the matter of setting a period back to which supply bills should be paid. The effort of Mr. Michaels was, of course, in the interest of all creditors whose bills for operating materials and equipment have not been paid in the past few months. The order of Sept. 9 appointing the temporary receiver has set Aug. 1 as the date to which the receiver should revert in the payment of current supply accounts. Mr. Michaels urged that claims for necessary supplies dating back to Jan. 1, 1920, should be paid, as the setting of this date would include practically all such bills. These, he said, should be paid without necessity for intervention or special hearing to disclose preferential character.

Edward Russell Platt, representing the bondholders' committee, suggested that the payment of back debts of this nature under receiverships was only a custom, and had almost always resulted from agreement, and not from a declaration of a principle. He suggested that all parties with such interests ought to have a day in court, and outlined a plan for quick action on such bills. His plan was for the receivers to make a list of bills contracted in the past four to six months, make recommendations as to bills which were entitled to preference, and present the lists and recommendations in court. At such hearing, creditors could state objections, and additions or subtractions might be made. Such plan, he urged, would avoid putting a heavy burden upon the court, in hearing individual claims separately; the mass of claims could be got out of the way promptly.

$366,000 IN CLAIMS PENDING

Judge Stone read from the bench a statement secured by him from the board of control, indicating the total of claims pending, unpaid since Jan. 1. Incidentally it was stated by Colonel Kealy that all supply bills had been met since Aug. 1 The statement read by the judge showed a total of about

$366,000; in this was $184,000 for supplies, $44,000 for street cleaning, and minor items.

On Wednesday the court issued the formal order establishing the receivers. This order set no date as the beginning of any period of priority for supply creditors. The matter was left, therefore, in the position suggested by Mr. Platt. The receivers are expected shortly to prepare a list of claims, so that the bulk of supply bills pending can be disposed of promptly. It is said that all current bills were paid by the company as deliveries of supplies were made, up to about June of this year; and since the temporary receiver paid bills dating back to Aug. 1, the unpaid bills have dates within a short period.

The matter of contracts for bridges and viaducts, and payments thereon, has come up at each session. The Twenty-third Street viaduct matter has occupied much time. Wyandotte County, Kansas, has completed the Kansas end of this viaduct; and the part of the cost which the railway was to pay is part of the $800,000 claimed as owing Wyandotte County on various bridges and viaducts, most of this having been reduced to judgments. Kansas City, Mo., entered into a contract with the railway and railroads, under which the electric railway was to pay about $250,000 toward the building of the Missouri end of the viaduct. The contract for erection was let, and work is in progress. The city of Kansas City, Mo., and the contractor intervened in the receivership proceedings and have sought to secure establishment of the contract under the receivership. Decision was postponed at the first two recent sessions concerning the receivership, until the receivers might have opportunity to examine the subject.

CITIES INTERVENE

On Oct. 30, the attorney for the city again brought up the matter, urging that immediate action be taken, so that the contractor would know his status. At this time, the first intimation was heard of opposition to the adoption of the contract immediately by the receivers. Blatchford Downing, attorney representing the second mortgage bondholders, and incidentally, first mortgage interests also, suggested the advisability of a hearing, and receipt of testimony before conclusion could be reached as to the necessity for this viaduct in the present operation of the property. He pointed out that the viaduct is designed to serve chiefly Kansas City, Kan.; and that the Kansas City, Kan., section of the property is now not making money. Counsel for Kansas City responded that it was a franchise obligation, and whether the Kansas end of the system or the viaduct itself was profitable to the company was not a factor. He added that the viaduct was to be a benefit to the company, as well as to the city.

Judge Stone directed that the opposition to the adoption of the contract by the receivers be made formal in pleadings to be filed on Nov. 1 and Nov. 3 was tentatively set for hearing.

At this juncture Judge Stone mentioned the prospect of appointment of special master. He said that he wished to hear the viaduct matter himself, but that many subjects were likely to be presented which it would not be feasible for him to hear in person. He suggested that attorneys advise him in advance when a mass of testimony is to be presented in any of the incidental controversies, so that a special master could be appointed.

Mr. Downing, representing the individual trustee under the second mortgage, suggested that he was not at present in a position to file a cross bill asking for foreclosure of the second mortgage and possibly would not be until the New York Trust Company comes into the present proceedings. Second mortgage interests, he said, are parties to these proceedings because defendants to the intervention of the parties to the first mortgage.

So far as the company is concerned there are very many business men in the city who have tried to help restore the company in the good esteem of the public. It is only fair to these men, as well as to the company and its officials, to say that the company stands higher now in public esteem than any other railway ever did in Kansas City.

There are two elements of the public that feel real sympathy for the company in its difficulties. One element is the business men, who realize the insuperable obstacles the company has encountered to successful operation—one of these obstacles being the rise of the jitney. This element feels that there is no way to get service without paying what it is fully worth, paying now or later, in some way.

The other sympathetic element has grown largely in the past few months. It is of car riders. They realize the importance of service to the city and themselves. They are somewhat indignant at the jitney—not finding fault with the men who run jitneys, but deploring the course of events which has made the jitney so sharp a competitor of the railway, but deploring most the development of this jitney service, which is to a degree irresponsible, unreliable, without regulation, so largely without resources to meet liability.

The receivers therefore take hold of the company under conditions far more propitious than are often found in similar circumstances. There are few complaints as to service; there are few accidents. The trainmen are courteous, and perform their work well.

The employees are contented now. They have their own brotherhood, with machinery for handling grievances, machinery which has been effective. They hope for the same facility of intercourse with the receivers and under the receivers that they have enjoyed heretofore. They hope that no opportunity will be presented to union agitators to promote disruption.

OUTSIDE LABOR ACTIVE

On the other hand union labor circles in Kansas City have hoped to find in the receivership an opportunity for reestablishing their policies and methods in the railways. That the unions are thus disposed is indicated in a letter sent to Judge Stone, before his appointment of permanent receivers. This letter recommended the immediate discharge of the present officers of the company, and urged the appointment of a single receiver, especially recommending F. C. Niles, the temporary receiver.

Deficit Continues on Chicago "L"

The first full month's operation under the 10-cent cash fare, with four tickets for 35 cents, on the Chicago Elevated Railways showed for September a net deficit of $25,361. This rate of fare was authorized on Aug. 4, but did not become fully effective until Aug. 9, so that August figures reflect the increase but do not show the full effect. A summary statement for the last three months follows:

	July	Aug	Sept.
Total earnings	$1,401,065	$1,458,708	$1,434,377
Total expenses	1,254,520	1,411,253	1,254,331
Net earnings	$146,545	$47,455	$180,046
Interest charges	206,160	205,682	205,407
Net deficit	$59,615	$158,227	$25,361
Number of passengers (1920)	17,024,667	15,025,599	14,698,167
Number of passengers (1919)	13,990,060*	13,578,959*	14,169,071
Increase	3,034,604*	1,446,640	529,096

*A strike of three days in July and one day in August makes these figures abnormally low and the comparison with 1920 for both July and August not fair. Also, the traffic in July, 1920 was abnormally high, due to several events which brought a great many people to Chicago during that month

It should be explained in connection with the large operating expense in August that this includes $145,336 of back pay accumulated in June and July, resulting from the last wage increase which was made retroactive to June 1.

Syracuse Valuation Wins Praise

The valuation of the city lines of the New York State Railways in Syracuse, made recently by Ford, Bacon & Davis, New York, and mentioned on p. 610 of the issue of this paper for Sept. 25, has received favorable comment in the Syracuse paper, and its acceptance has been recommended by the City Street Railway Commission. In referring to the appraisal in an editorial, the Syracuse Herald praises the thoroughness with which the work was done and speaks of the "judicial impartiality" of James C. Emery, who was in charge of it for the appraising engineers.

Cincinnati Deficit Increasing

The report of the Cincinnati (Ohio) Traction Company to W. C. Culkins, Street Railway Director, shows a deficit of $68 954 in September. The total operating expense for the month was $559,898. Taxes and other deductions amounted to $274,854. Detailed accounting of the operating expenses shows that $61,749 was spent on ways and structures. Equipment last month cost $70,968 and power $108,600. The item conducting transportation consumed $274,907. One thousand and twenty-seven dollars was spent on traffic and $42,646 for general and miscellaneous. The number of revenue passengers during the month was 9,561,608. The deficit is said to be due to the increased cost of coal and wages and the falling off of travel. The fare in Cincinnati is 8 cents cash. The figures of operation are included in the accompanying statement.

	September 1920	September 1919
Operating expenses:		
Ways and structures	$61,749	$70,240
Equipment	70,968	43,489
Power	108,600	75,379
Conducting transportation	274,907	232,389
Traffic	1,027	812,54
General and miscellaneous	42,646	38,174
Total	$559,898	$460,487
Taxes and other deductions	274,854	242,818
Total cost of service	$834 753	$703,305
Total revenue and income	$765,798	$672,052
Total deficit	$68 954	$31,252
Fare	8 cents cash or ticket	7 cents cash 6½-cent ticket
Revenue passengers	9,561,608	9,972,289
Density of traffic	5.50	5.64

Some B. R. T. Lines Restored

Shuttle service has been installed on three of the nine trolley lines on which service was temporarily abandoned recently by the Nassau Electric Railroad and the Brooklyn, Queens County & Suburban Company of the Brooklyn Rapid Transit System because the operating revenues of the lines failed to meet actual operating expenses by $500,000 a year.

The Metropolitan Avenue Line, with a mileage of 9.336, has been replaced by a shuttle service from Flushing Avenue to Dry Harbor Road, a distance of 2½ miles. The Ocean Avenue line, with a mileage of 10.038, has been replaced by a shuttle service from Flatbush Avenue and Avenue F to Ocean Avenue and Avenue W. The shuttle line is about one-third the mileage of the old route.

The Thirty-ninth Street-Coney Island line, with a distance of approximately 8 miles, has been replaced by a shuttle line operating about 2 miles from Fifth Avenue and Eighty-sixth Street to Bath Avenue and Bay Nineteenth Street.

All three shuttle services were installed at the request of residents of the territories traversed by the lines who stated at hearings before the Public Service Commission that they were primarily interested in securing service and were willing to pay whatever it cost to provide service. Representatives of civic bodies stated they were not opposed to an increased fare if it actually cost more than 5 cents to provide service and the alternative to the increased fare was no service at all.

Proceedings are still pending before the commission for the restoration of service on the Church Avenue line, with a mileage of 6.419, without the necessity to give or receive transfers to and from the dozen intersecting and connecting lines. Investigators for the commission reported that inquiries along the route of this line failed to disclose a single resident who was opposed to the abolishment of the transfer privilege.

Financial News Notes

Discontinuance Asked.—The Dover, Somersworth & Rochester Street Railway, Dover, N. H., has petitioned the Public Service Commission for permission to discontinue its tracks in Rochester on North Main Street, from the Central Square to Strafford Square.

750,000 of Bonds Planned. — The Cincinnati (Ohio) Traction Company has petitioned W. C. Culkins, Director of Street Railways, to be allowed to issue $750,000 par value of bonds to reimburse the company for extensions and improvements. Application also will be made to the State Public Utilities Commission to determine the terms under which the bonds shall be issued.

Road at Abilene May Resume Operation.—An ordinance has been passed by the local authorities at Abilene, Tex., amending the franchise of the Abilene Street Railway. In consequence it is expected that the line will resume operation. Some four or five months ago the American Public Service Company, Dallas, Tex., agreed to take over the railway and to spend about $60,000 in repairs to track and equipment.

Application to Issue Notes Granted.—The Wisconsin Railroad Commission on Oct. 25, 1920, granted the Milwaukee Electric Railway & Light Company permission to guarantee as to principal and dividends $1,090,000 of ten-year 8 per cent sinking fund equipment trust gold certificates. The proceeds from the sale of these notes will be used to finance the purchase of the railway cars ordered to be installed by the commission. The company's application was referred to in the ELECTRIC RAILWAY JOURNAL of Oct. 23, 1920, page 893.

Steam Road Seeks to Purchase Electric Line.—Negotiations have been in progress for some time for the sale of the Sacramento Northern Railroad, Chico, Cal., formerly the Northern Electric Railway, to the owners of the Western Pacific Railroad. The matter has been placed before the New York office of the Western Pacific Railroad and it is said that John S. Drum, president of the Mercantile Trust Company and a director of the electric road, and G. F. Detrick, president of the electric line, have been handling the negotiations with the railroad. The electric railway extends northward from Sacramento through the valley as far as Chico.

$1,750,285 Net for Monongahela Company.—Net earnings of the Monongahela Valley Traction Company, Morgantown, W. Va., for the twelve months ended Sept. 30 last, are practically double the annual bond interest charges of the company. The report of the period shows: Gross earnings, $5,538,110; operating expenses, taxes, depreciation and sinking funds, $3,787,824; net earnings, $1,750,285; annual interest charges on $15,237,000 bonds, $883,590; balance, $866,695. Net earnings are stated after depreciation sinking fund requirements, which for the twelve-month period amounted to more than $170,000. If these were excluded the ratio of net earnings to annual bond interest charges would be nearly 2.2 times.

Tax Liability Fixed.—By a decision recently handed down by Judge Clay Allen in the Superior Court at Washington, D. C., the Puget Sound Traction, Light & Power Company must pay delinquent taxes aggregating the sum of $401,017. The suit of the company against King County sought last June to enjoin the county from collecting taxes on the railway for the year 1919. The company will appeal the decision. The actual transfer of the lines from the company to the city of Seattle took place on March 31, 1919. During 1919 the company was in possession of the lines for three months and the city for the remaining nine. This means that the city will pay three-fourths of the taxes and the company one-fourth.

St. Louis Traffic Increasing.—With a daily average of eight fewer cars in operation the United Railways, St. Louis, Mo., in the quarter ended Sept. 30 last, carried 143,388 more passengers than in the preceding quarter, according to the quarterly report filed with the City Register of St. Louis. The report shows that during the quarter 69,756,328 passengers were carried as compared with 69,612,940 in the preceding period. The average number of cars in operation on weekdays during the last quarter was 1,310; on Saturdays, 1,220, and on Sundays 760, an average of 1,208. In the preceding quarter the average was 1 216. Col. A. T. Perkins, general manager for the company, said that every effort was being made to get more cars into service. The first of fifty cars being built in the company's shops are being assembled and will be ready for service soon. Ten one-man cars being built by the American Car Company are to be delivered Dec. 1.

Traffic and Transportation

Jitney Bill Defeated

Seattle Voters Reject Proposal to Give Bus Operators Control Over Service and Fares

At a referendum held in connection with the general election on Nov. 2 the voters of Seattle, Wash., decisively rejected an ordinance which, if approved, would have given bus operators authority to select routes and to regulate fares without interference from the city government. The bill had been sponsored by the bus interests in an effort to nullify the terms of a local ordinance ruling the jitneys off the streets served by the Seattle Municipal Street Railway.

The judiciary committee of the City Council, after extended conference with representatives of the jitney interests, has adopted the jitney bus routes drafted by Carl H. Reeves, superintendent of the utilities department. The action was taken after Mayor Hugh M. Caldwell had called for a "showdown" with the jitney men, who objected to regulation not of their choosing. The Mayor said:

> If the jitney operators won't accept anything but their own terms, and we must have a showdown, let's have a showdown. If they won't accept reasonable regulation, let's pass the regulations as we see fit, and let them accept or quit. I concede that when 9,000 persons use the buses in a day, they should be given some consideration, but neither they nor the operators have any right to insist on the terms on which they are to run. Let us effect a compromise with the jitney drivers or any other we can agree with, and let the others take the regulations or leave them. The operators can't keep the city tied up indefinitely on this court litigation.

WOULD LIMIT PASSENGERS

The regulations provided in the recommendations made by Mr. Reeves and adopted by the committee provide for limiting passengers carried to two more than the seating capacity of the jitney, except on cars where standing room is available—to permit the present 10-cent fare to stand except on long drives, such as the Alki line, where a 15-cent fare will be favored, and to allow a 25-cent fare after 1 a.m.

If the Council passes the amendments and adopts the routes outlined, the jitney men must then file new applications for permits, as all but a few were refused permits by the Council after the passage of the present ordinance.

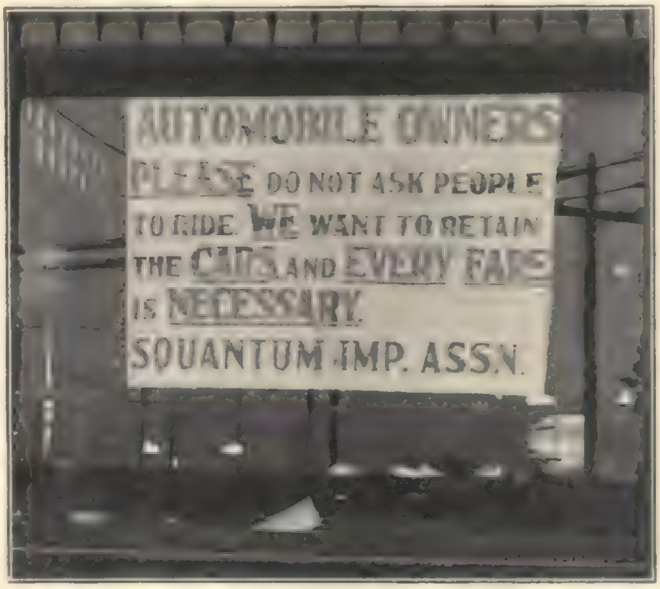
Another problem still pending is the one of time schedules. It is expected more difficulty will develop in this matter than on the question of routes. The drafting of the schedule was to be speeded, as the stand of the jitney men on the jitney referendum bill depended on whether satisfactory regulations are adopted by the city before the special election.

In a communication to the Mayor and the City Council, D. W. Henderson, general superintendent of railways, stated that jitney buses are costing the municipal railway $160,000 or more a year, and that unless strict regulation is effected, 500 to 600 buses will be running the streets taking the cream of the traffic, and cutting still further into the railway revenues.

Mr. Henderson recommends that the jitneys be forced to give regular and reliable service, staying on their respective routes, and operating daily for the convenience of their patrons.

An Appeal to Save a Railroad

Two years ago the Eastern Massachusetts Street Railway discontinued the Squantum line as the receipts were not paying operating costs. When the operation of jitneys was discontinued about three months ago, the Board of Trade asked Mayor Whiton of Quincy to request the Eastern Massachusetts Street Railway to restore service on the Squantum line. The company found that it would cost $25,000 to rehabilitate the property and stated that if the city of Quincy would post $25,000 to insure against the company's loss, service would be restored. The company reconstructed the line and soon after the operation started.



HOW SQUANTUM AIDS THE TROLLEYS

Since then another factor has entered the field to hinder the operation of this line at a profit. Automobiles entering and leaving Squantum have picked up prospective patrons of the street cars along the road and transported them free to Quincy or Squantum. The Squantum Improvement Association was formed to combat this practice. It erected a very novel sign to appeal to the automobilists and had it set in a very prominent location.

P. R. T. Charges 7 Cents

Company Raises Fare at Direction of Public Service Commission—Four Tickets for a Quarter

Nickel fares became a memory on Nov. 1 as far as the Philadelphia Rapid Transit Company is concerned. On that date the company placed in effect the 7-cent cash fare previously ordered by the State Public Service Commission. Under the new plan four tickets are sold for 25 cents. Payment of fare in the form of cash or tickets entitles riders to free transfers or 3-cent "exchanges" as under the 5-cent fare.

A feature of the new rate system is the method of computing the fare to be paid by children. Heretofore age has been the determining factor in allowing children to ride free. Under the new arrangement payment of fares depends upon height, all children more than thirty-one inches tall being required to pay full fare. A line has been marked in each car near the conductor's station by which children will be measured as they enter the car.

The new rates are to continue in effect for a period of six months. Company officials estimate that the 7-cent cash fare with reduced rate tickets will yield less in revenue than the straight 5-cent fare without transfers or exchanges, as proposed by Thomas E. Mitten, president of the company.

Simultaneously with the advance in fares the company began paying its employees at the rate of 72.5 cents an hour, an increase of 7.5 cents over the former scale. Under the wage agreement between the company and its men the latter were entitled to this increase beginning May 16 and June 1. At the urgent request of Mr. Mitten the carmen agreed to forego the wage increase pending the granting of a higher fare.

Mr. Mitten has announced that the company will immediately begin the accumulation of a reserve fund so that the men can be given the back pay now due them at as early a date as possible. By this means the management hopes to be able to turn over this back pay to each man in a lump sum, if possible before Jan. 1. Mr. Mitten has urged the men to place this money with their savings in anticipation of an ultimate reduction of wages to 65 cents an hour. Mr. Mitten some time ago warned the men that the new wage scale was only temporary and that, with the return of a lower level of prices, the men must expect a reduction in pay.

Fare Advance an Issue

Labor Opposed to Rate of Seven Cents Put Into Effect at Fort Worth Recently

An injunction looms up as probable to restrain the Northern Texas Traction Company of Fort Worth, Texas, from continuing in effect the 7-cent fare started on Oct. 22 in the city of Fort Worth. Organized labor has taken up the fight and the City Commission has also expressed opposition. In response to a formal request from the City Commission for data showing the necessity for the fare increase, George H. Clifford, general manager, explained the grounds on which the recent advance in the rate was made.

Mr. Clifford explained that contracts had expired under which the company had been purchasing fuel oil for 90 cents a barrel and that since Oct. 1 the company had been paying $3.50 a barrel for fuel oil in the open market. Mr. Clifford also pointed out the improvements now under way and pledged called for an outlay of more than $1,000,000. These include the purchase of thirty-five new one-man cars.

Protestants against the fare increase point out that these improvements were pledged by the company in return for the recent increase in fares from 5 cents to 6 cents, and that the company cannot again advance the matter of improvements as grounds for another fare increase.

The City Commission has advised those protesting against the fare increase that the only recourse is in the courts. The franchise under which the company operates authorizes it to charge a fare that will make adequate return, and the company is judge of the fairness of the return. The only recourse, once the new fare is put into effect, is to restrain the higher fare through the courts.

Eight Cents in New Orleans

The New Orleans Railway & Light Company, New Orleans, La., on Oct. 22 raised its fare from 6 cents to 8 cents by authority of the Commission Council. The Council approved the fare advance on Oct. 19 as a means of averting a second strike of the railway's employees. The new fare will continue for a period of six months. Free transfers are retained.

The increase in fare was recommended in the report of the special masters who heard the men's demands for higher pay following the strike which tied up electric railway service in New Orleans last July. The local Association of Commerce was largely responsible for bringing about an agreement between the city and the company on the fare question. Danger of another strike was removed on Oct. 21 when J. D. O'Keefe, receiver of the company, and James Rodgers, representing the carmen, signed a contract under which the men will be paid at the rate of 49, 52 and 55 cents an hour.

Futile efforts have been made by groups of citizens hostile to the company to compel it to abandon the 8-cent fare. Criminal charges were brought against Mayor Behrman, Mr. O'Keefe and other officials of the city and the company, on the ground that they had violated the law in permitting the fare increase. These charges were dismissed by the court on Oct. 27. Petitions have also been circulated calling upon the Commission Council to submit to popular vote the question of reducing the fare to the original 5-cent basis.

Ten-Cent Fare in Effect

A straight 10-cent fare went into effect on Nov. 1 on the lines of the Connecticut Company, New Haven, Conn. There was a noticeable falling off in patronage on many of the lines in Hartford and in other larger cities of the State on the first day under the new fare régime. However, the railway officials take the stand that as winter comes on there will be the usual patronage of the trolleys.

Jitneys were running in Hartford as usual on Nov. 1 despite the city ordinance which ruled them off the main highways when the 10-cent fare went into operation. This continuance of bus service was due to an agreement by counsel for the jitneys and the railway that both sides would await the decision of the Superior Court on the pending injunction which, if granted, would bar the railway from forcing the jitneys off the main thoroughfares. The buses did not do a heavy business on the first day because of the 10-cent trolley fare.

"Knocking" Safety Cars Forbidden

Platform men in the employ of the Los Angeles (Cal.) Railway have been forbidden to make remarks "tending to bring the safety car into ridicule" under penalty of severe discipline. George B. Anderson, manager of service of the railway, has issued an order instructing every carman to "speak of the advantages of this car, if he refers to it at all in conversation with the public." The order, which is addressed "to all trainmen, especially motormen," reads:

> Your attention is especially directed to bulletin No. 389, issued Sept. 27 by R. B. Hill, superintendent of operation, which states that any trainman unnecessarily ringing his gong when he finds a safety car on the track ahead of him or any trainman who makes remarks tending to bring the safety car into ridicule will be subjected to severe discipline.
>
> Violations of this rule will be interpreted as exhibitions of disloyalty to the company, actuated by a desire to incite the public against a car which experience shows is better adapted for quick and safe street railway service than any other type of car.
>
> Every trainman who is interested in safe and successful operation will speak of the advantages of this car, if he refers to it at all, in conversation with the public. If a man's attitude toward the safety car is unfriendly it will be taken for granted that he is not interested in safe and successful operation and he will be treated accordingly.
>
> We do not desire in our service any man who, by word or deed, stirs up public antagonism to the service which we are endeavoring to render.

Transportation News Notes

City Grants 8-Cent Fare.—The Board of Aldermen of Concord, N. C., recently authorized the North Carolina Public Service Company, Greensboro, to charge an 8-cent cash fare on its lines in Concord. The new rate took effect on Oct. 1. Four tickets are sold for 30 cents.

Higher Freight Rates Sought.—The Pittsburgh (Pa.) Railways has filed with the State Public Service Commission notice of an advance in local freight tariffs, under which it proposes to raise class rates 40 per cent. The company also seeks a minimum rate of 50 cents on each shipment.

Fares Raised on Interurban.—Fares on the lines of the Kentucky Traction & Terminal Company, Lexington, Ky., have been advanced to a basis of 3.6 a mile. The company formerly charged at the rate of 3 cents a mile. The company has also raised its freight rates. The minimum fare remains at 7 cents.

Will Raise Glen Cove Fare.—The Glen Cove (N. Y.) Railroad has been authorized by the State Public Service Commission, Second District, to raise its fare from 5 cents to 7 cents. The company is a subsidiary of the Long Island Railroad and is capitalized at $10,000.

Ticket Sale Discontinued.—The Wisconsin Railroad Commission has granted the petition of the Milwaukee Northern Railway, Cedarburg, to discontinue the sale of six tickets for 25 cents good on the company's line within the city of Milwaukee. A straight 5-cent fare became effective on Aug. 15.

Ten Cents in Adrian.—The Adrian (Mich.) Street Railway has raised its fare from 5 cents to 10 cents. The company has been in financial straits for several months. A committee of Adrian citizens has been negotiating with the railway management with a view to the municipal operation of the system.

Eight Cents Asked in Auburn.—The Auburn & Syracuse Electric Railroad, Auburn, N. Y., has applied to the Public Service Commission for the Second District for permission to charge an 8-cent cash fare on its Auburn city lines. The Auburn City Council recently passed an ordinance waiving the city's right to oppose the increase.

Would Raise Augusta Fare.—The Georgia Railroad Commission will hold a hearing on Nov. 23 on the application of the Augusta-Aiken Railway & Electric Company, Augusta, for authority to make a general increase in its rate. The present fare in Augusta is 7 cents. The company has not stated the amount of the increase to be asked.

Six Cents in Huntington.—The West Virginia Public Service Commission has authorized the Ohio Valley Electric Railway, Huntington, to raise the fare on its Huntington lines from 5 cents to 6 cents beginning Nov. 8. The commission has directed the company to complete within sixty days track improvements now under way.

Would Abolish Tickets.—The Butte (Mont.) Electric Railway has applied to the State Public Service Commission for authority to discontinue the sale of reduced-rate tickets. The commission last June allowed the company to raise its cash fare to 8 cents provided that tickets be sold at the rate of 7 cents each. The company's petition has been taken under advisement.

Commission Hears Rate Plea.—Hearing was held on Oct. 21 by the Public Utilities Commission of Utah on the application of the Utah-Idaho Central Railroad, Ogden, Utah, for permission to increase its minimum fare from 5 to 10 cents, one way, and from 10 to 20 cents, round trip. This fare affects trips of a distance up to about 2½ miles. No protests were filed with the commission.

Check on All Transfers.—Orders have been issued to conductors of the Los Angeles (Cal.) Railway not to throw away or destroy any transfers punched and not issued. Such transfers must be turned in to a division clerk with a report. The order is part of a campaign being made by the railway to have conductors punch all transfers correctly and accept them only at the proper transfer points.

Postpones Reading Increase.—The Reading Transit & Light Company, Reading, Pa., has announced that, pending action by the State Public Service Commission, it will take no steps to raise its fare from 7 cents to 8 cents. The company originally proposed to advance its rate beginning Oct. 27. A number of complaints have been filed with the commission opposing fare advance. The commission will hold a hearing on the matter on Nov. 19.

Street Collection in Los Angeles.—To speed up the loading of cars in the congested zone during rush hours, extra conductors of the Los Angeles (Cal.) Railway are being stationed at the street intersections to collect fares and permit passengers to enter at the front gate, which is ordinarily used as an exit only. Mail carriers bearing full sacks of mail are now permitted to enter by the front gate at all hours of the day. This plan has been approved to present delay and congestion on the rear end of the car.

Louisville Settlement Soon.—Settlement of the fare difficulties of the Louisville (Ky.) Railway is expected at an early date, according to city officials and representatives of the company. The railway has been seeking an increase in fare from 5 cents to 7 cents under a cost-of-service plan. A member of the City Council recently stated that action on the fare question would be deferred until after the general election on Nov. 2. In the meantime the company is continuing its campaign of education by the use of advertisements in the Louisville newspapers.

Survey of Railway at Memphis Completed.—The main points of the survey by Ross W. Harris of the Memphis (Tenn.) Street Railway were outlined at a recent meeting of the Engineers Club. Numerous charts and maps were submitted showing the lines, location of population, etc. Mr. Ross is of the opinion that distribution of traffic is so unequal that better railway service is impossible under present conditions. The reasonable capacity of cars during rush hours is exceeded 50 per cent, the report states. Rerouting is recommended to take the burden of traffic off Main Street.

Telephone Dispatching Abolished.—Telephone dispatching of all cars has been abolished by the Los Angeles (Cal.) Railway. Car crews now follow their established schedules and telephone to headquarters only in case of serious delay or other trouble. The new plan relieves the conductors of telephoning from the terminal at every trip and gives the railway a saving in switchboard equipment and dispatchers. With the change, a number of new supervisors have been appointed to assist the car crews on the streets. Turn-backs or diversions from the regular route are recorded on a mileage card kept by the conductor and later submitted for inspection.

Seeks Curb on Jitneys.—The towns of Braintree and Holbrook, Mass., will be deprived of electric railway service at an early date unless they take steps to curb the operation of jitney buses within their borders. Homer Loring, chairman of the public trustees of the Eastern Massachusetts Street Railway, Boston, has informed the Boards of Selectmen of the two towns that the company will discontinue serving Braintree and Holbrook, unless the municipal authorities take steps to bar the buses. Mr. Loring contends that jitney competition makes it impossible to operate the lines in question in accordance with the provision of the Public Control Act.

Merchants Asked to Aid.—Use of co-operative tickets, good for rides on the Quincy Division of the Eastern Massachusetts Street Railway, to be furnished to suburban patrons, has been suggested by Forrest I. Neal, chairman of the home rule committee in charge of the division. Mr. Neal made the suggestion in replying to an attack by Col. Henry L. Kincaide, a former member of the committee, who claimed that merchants were losing suburban business because of high fares. Chairman Neal admitted the high fares were responsible to some extent, but blamed the cessation of war work for the greater part of the reduction of business. He declared that the Quincy Division was not on a paying basis at present, but was improving and in six months fares probably would be reduced.

Would Speed Up Service.—A readjustment in the running time of the cars of the Cincinnati (Ohio) Traction Company is urged by William C. Culkins, City Street Railway Director, now that the pay-as-you-leave plan has been tested thoroughly. Mr. Culkins in a recent letter to the company calls attention to the opportunity of improving the running time on many, if not on all lines. He points out that on many lines the cars crawl through the downtown district to avoid arriving at the terminal ahead of time. He states that he has received complaints that cars stop for as long as five minutes just outside of the "delivery" district. By readjusting the schedules so as to have the cars pass a given point on schedule on the out-bound trip, it is his belief that car service would be improved. He suggests further that car service could be reduced during the day, thereby saving a large sum of money for the company.

Ask More in Alton.—W. H. Sawyer and Fred E. Allen, temporary receivers for the Alton, Granite & St. Louis Traction Company, Alton, Ill., have filed a petition with Federal Judge English at Danville, Ill., for a 10-cent fare on the Alton city lines. The present fare in Alton is 8 cents. A report showing the receipts and disbursements since the railway was placed in receivership was also filed with Judge English. The receivers state that the men have been given an increase of 6 cents an hour. Motormen and conductors employed on limited trains are receiving 60 cents an hour, men employed on local interurban cars 59 cents an hour and Alton city line employees 57 cents an hour. This increase, which was granted by the receivers, has not been officially accepted by the men. The men, prior to the receivership, had made demands for an increase to 90 cents an hour. The naming of the receivers halted the arbitration of the wage demands and the 6-cent increase followed.

City Fights Fare Increase.—A brief has been filed with the California Railroad Commission by the City Attorney of Los Angeles opposing the granting of an increase in fare to the Los Angeles Railway. The company some time ago applied to the commission for permission to raise its rates, but failed to mention a specific increase. At subsequent hearings before the commission it was intimated that a 6-cent fare would be authorized. The city contends that business and financial conditions at the present time do not justify increased prices in any commodities. It also holds that under a 6-cent fare the company would accumulate a surplus of $500,000. H. Z. Osborne, Jr., chief engineer of the Los Angeles Department of Public Utilities, has presented a report to the commission favoring 6-cent fares on Los Angeles lines. Mr. Osborne maintains that the fare increase is necessary to permit the company to obtain additional equipment to give adequate service.

Interurban Rise Approved.—The Public Utilities Commission of Utah has granted an increase in passenger fares to the Salt Lake, Garfield & Western Railway, Salt Lake City, the electric railway known as the "Saltair Route." The company is granted permission to increase one-way passenger rates between Salt Lake City and Saltair Beach from 30 cents to 35 cents, or on a fare basis of slightly less than 2½ cents a mile. Petition for the increase was heard on Oct. 20, at which time the petitioner alleged that during the winter months the line was operated at a loss, and that traffic in the summer season was not sufficient to make up the excess of expense over cost of operation. The petitioner stated that the increase would not affect regular patrons of the road, provided they desire to avail themselves of the commutation rates, in which no increase was sought. The sale of coupon books will be continued at the price of $2.50 for ten one-way trips.

Six Cents Not Enough.—Richard Meriwether, vice-president and general manager of the Dallas (Texas) Railway, has announced that the company may be compelled to apply to the city authorities for a further increase in fare. The railway raised its fare from 5 cents to 6 cents several months ago. The financial results of the fare advance have not been satisfactory. Mr. Meriwether states that a 7-cent fare would be inadequate and that to meet operating expenses and to make needed improvements an 8-cent fare with two tickets for 15 cents would be required. The company's financial report for the month of September shows that the rate on the property valuation for that month was 3.4 per cent. The authorized monthly return is 7 per cent. Nine months ago, under a 5-cent fare, an average of 4.5 per cent was being earned. Gross earnings for the month of September amounted to $279,057, with operatng expenses of $210,973. The operating income, after caring for authorized reserve funds, is given at $25,853.

Fare Increase Hearing Held. — A hearing was held by the Railroad Commission of Wisconsin on Oct. 18 at Kenosha, Wis., to consider the recommendation of the State Board of Conciliation that the wages of trainmen employed on the lines of the Wisconsin Gas & Electric Company in Kenosha be advanced to the same scale that is now being paid in Racine and Milwaukee. The company indicated that an increase in fare of 1 cent would have to be granted in order to meet the proposed increase in wages. The fare which is at present 6 cents would thus be increased to 7 cents. Reduced rate tickets might, however, be sold. The case was taken under advisement by the commission. At the hearing it is reported to have been brought out that for the first time in three or four years it was now possible to get abundant help in Kenosha and that men were willing to go to work as trainmen at the present wage schedule. Representatives of the company therefore opposed the proposed wage schedule.

Personal Mention

I. L. Ward Leaves P. E.

General Purchasing Agent Joins Manufacturing Concern—Messrs. Thorburn and Fenimore Step Up

I. L. Ward resigned on Nov. 1 as general purchasing agent of the Pacific Electric Railway, Los Angeles, Cal., to accept a position as general manager of the Steel Mill & Foundry Supply Company, a newly organized corporation doing business in Los Angeles.

C. Thorburn, general storekeeper of the Pacific Electric, has been appointed purchasing agent to succeed Mr. Ward.

C. C. Fenimore, who has been serving as chief clerk to the purchasing agent, has been advanced to the position of general storekeeper, to succeed Mr. Thorburn. Mr. Fenimore has been connected with the company since 1909, his work for the most part having to do with the stores department.

I. L. WARD

Mr. Ward became general purchasing agent of the system in 1917. He was previously connected with the Southern Pacific Company, with headquarters in San Francisco. As purchasing agent of the P. E. lines he succeeded F. W. Taylor, who left the Pacific Electric to become purchasing agent of the Southern Pac fic's System in the territory from El Paso to Portland.

Mr. Ward gained his early railroad experience with the Chicago, Rock Island & Pacific Railway, in the maintenance of way, mechanical and stores departments. Ten years ago he joined the Southern Pacific Company, serving first as chief clerk to the general storekeeper and later as storekeeper, general stores, and chief clerk of the purchasing department.

Mr. Thorburn, by taking over the purchasing department of the Pacific Electric, becomes one of the largest purchasers of materials in southern California. He entered the service of the company in May, 1909, as stores department accountant in the office of the auditor. Like Mr. Ward, he had previously been connected with the stores deparment of the Southern Pacifice. In December, 1909, he was made chief clerk to the general storekeeper of the Pacific Electric, and three months thereafter was promoted to general storekeeper, continuing in that position until receiving his new appointment.

Donald F. Hine has joined the staff of the ELECTRIC RAILWAY JOURNAL as an editorial representative and will devote his attention to the preparation of articles of an engineering nature. Mr. Hine is a native of Fisher's Island, N. Y. After completing the regular course in electrical engineering at the Sheffield Scientific School of Yale University he spent a year at the same institution doing special engineering work in the graduate school.

A. L. Gibson has been appointed superintendent of the Lawrence District of the Eastern Massachusetts Street Railway, Boston, Mass. Mr. Gibson has been connected with the railway for a number of years, starting in the Chelsea District as a platform man. Later he became car house foreman in Revere and for the last several years has served as superintendent of the district including Woburn, Reading, Wakefield and contiguous towns.

Charles Gordon has been appointed engineer of equipment of the Chicago Surface Lines, reporting to H. H. Adams, superintendent of equipment. Mr. Gordon was connected with the Surface Lines from the time of his graduation from the railway electrical engineering department of the University of Illinois in 1912 until December, 1917, when he resigned to enter the United States Army as air service engineer officer of the 276th Aero Squadron with the rank of second lieutenant. Since his discharge from military service in April, 1919, he has been with the sales and service department of the Vacuum Oil Company.

G. Dieden, managing director of the street railways of Gothenburg, Sweden, is spending a few weeks in this country, studying the operation of safety and other modern types of cars. Mr. Dieden was an observing attendant at the recent Atlantic City convention, where he laid plans for visits to Montreal, Buffalo, Philadelphia, Baltimore, Newark and a few other cities with railway conditions comparable with those in Gothenburg, which although of smaller population than any of those mentioned is the second city in Sweden in population. Mr. Dieden also hoped to spend a couple of weeks in Florida, by way of a vacation before sailing for home.

Dual Receivership in Kansas City

Col. Frederick Fleming and Francis M. Wilson Appointed Permanent Receivers—Aim to Secure Good Will of Public

Col. Frederick Fleming and Francis M. Wilson, long active in the business and professional life of Kansas City, Mo., were appointed on Oct. 26 the permanent receivers of the Kansas City Railways. The appointments were made by Judge Kimbrough Stone of the United States District Court, before whom the receivership proceedings were brought last August. Judge Stone on Oct. 30 designated James E. Goodrich counsel for the permanent receivers. Messrs. Fleming and Wilson have announced that they will devote their entire attention to their new duties. Colonel Fleming several years ago retired from direct participation in the affairs of the various corporations in which he is interested. Mr. Wilson resigned as Federal District Attorney immediately after his appointment to the receivership board, his resignation being accepted by Attorney General Palmer on the same day.

THE receivers have spent most of their time since appointment in making themselves familiar with all phases of the operation of the property. They have not yet established offices, but will do so shortly in the railways building. They are also painstakingly studying the problem of building up public good will. This they consider one of their most important duties. Just what this work of "building good will" implies may be differently explained by different factions in Kansas City.

COL. FRED W. FLEMING

The most commonly heard explanation of the company's financial predicament is the jitney. The jitney began to flourish and seriously to detract from the railway's revenues after the strike of 1918. It is asserted by some critics that the public was unfavorable to the company, and therefore patronized the jitneys operated by former employees. That much of the propaganda favoring patronage of jitneys, and encouraging to the operation of jitneys, sprang from opposition to the company is well known.

Colonel Fleming will serve as the "business man" on the receivership board. He is pre-eminently qualified for his new work both by training and experience. He was appointed to the directorate of the Federal Reserve Bank of the Tenth District, shortly after the bank was established, to represent large financial and business interests of the district. At that time he was chairman of the board and business manager of the Kansas City Life Insurance Company.

COLONEL FLEMING A CANADIAN

Colonel Fleming was born in New Brunswick, Canada, on Aug. 9, 1866. He was graduated from Ricker Classical Institute, Houlton, Maine. In 1885 he went to Atchison, Kans., where he taught school for two years. He then entered business in Kansas City, where he has since resided. Joining a real estate, insurance and investment concern as a clerk, he later opened his own office. He subsequently established and operated a printing office. This plant was later bought by Col. Cusil Lechtman, and is now one of the largest in the West.

In 1904 Colonel Fleming and his associates bought the Kansas City Life Insurance Company, Colonel Fleming personally holding the controlling interest. He was secretary and general manager of the company for several years, and was then made chairman of the board. He retired from the company in 1918 because of impaired health. He is now fully recovered and seems as vigorous as ever. He was one of the leading figures in the various "drives" staged in Kansas City during the war. He served as director for the Middle Western Division in the War Savings Certificate campaign.

The title of "Colonel" resulted from his war and National Guard service. He was one of the organizers and major of the "Marmaduke Guards," which served as a unit of the Third Regiment from Kansas City in the Spanish-American War. At the end of the war he reorganized the regiment and became its colonel. Colonel Fleming was formerly active in local and state politics.

MR. WILSON A MISSOURIAN

Mr. Wilson, co-receiver with Colonel Fleming, is an avowed friend of the railway. Shortly after his appointment he stated that ever since coming to Kansas City he had patronized the trolleys as a matter of principle. "I use my motor car for other purposes," he said; "but I have felt that a citizen should use the utilities provided for specific purposes, as in the case of the street railway, so I ride to and from work on the cars."

Mr. Wilson is a native Missourian. He was born on June 13, 1867, in Platte City, in the county adjoining Kansas City, Kans., on the north. He has always lived in Platte County and in Kansas City, Mo. He was educated at Vanderbilt University, Nashville, Tenn., and Centre College, Danville, Ky. In 1889 he was married to a daughter of Senator Francis M. Cockrell. He was prosecuting attorney of Platte County for two terms; member of the Missouri State Senate in 1899, and chairman of the Senate and House joint committee on revision of statutes. He was again a member of the Senate in 1911 and in 1913, being president pro tem. in the latter year. He resigned from the Senate in August, 1913, to accept from President Wilson the appointment of United States District Attorney for the Western District of Missouri. He was reappointed on July 23, 1917, for a term ending Aug. 4, 1921.

James E. Goodrich, appointed counsel for the receivers, was born at Cameron, Mo., on Sept. 20, 1871. He removed to Kansas City twenty years ago. He sat on the Circuit bench in Jackson County, Mo., for six years, retiring to private practice in 1913. He has been attorney for the Federal Reserve Bank of the Tenth District since the bank's organization, and is also attorney for the National Bank of Commerce. He represents many other banks and corporations as special counsel. He is a Republican in politics, and was a delegate to the Republican National Convention in 1900. However, he has been employed as counsel irrespective of his political affiliations, having represented a Democratic police board, for instance, in proceedings to compel the granting of an appropriation for the city's police department. His present appointment was made by Judge Stone with the approval of the receivers.

F. M. WILSON

Judge Goodrich is a member of the board of curators of the University of Missouri and is a member of the executive committee. He is one of the few local attorneys who have been active for several years in the Kansas City Chamber of Commerce.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Transformer Market Steady

Prices Hold Firm, as Production Continues from Stocks of High-Priced Raw Materials

Power and distribution transformers continue in good demand. A leading manufacturer is considering increasing his facilities, so great is the faith of the sales force in the future market. Inquiries and orders show little evidence of the business recession apparent in some fields. A representative of the ELECTRIC RAILWAY JOURNAL found one of the largest plants in the country working full time a few days ago, with several months' orders on the books. Deliveries are quoted around five months on medium-sized power transformers and three months or less on distribution transformers. Both classes of transformers are in about the same demand.

Prices hold firm and raw material is in good supply, barring a shortage of tank iron and some scarcity in Egyptian cotton. It is doubtful if the shortage of cotton experienced earlier in the year can be made up before January. Large stocks of copper and sheet steel must be worked up by the manufacturers before the buying of raw material at reduced prices can be reflected in factory costs, it is said. Wages have not been reduced to any extent as yet, nor layoff of men required; in fact, employees are still being taken on in one of the large eastern factories.

The importance of purchasing transformers with more regard to all-day efficiency is being emphasized in some circles. The high price of coal and the continuous core and line losses involved in scattered installations especially are leading the progressive buyer of transformers to study more carefully than hitherto the engineering characteristics of this class of equipment. In some cases, it is pointed out, the purchaser can afford to pay 15 to 25 per cent more in transformer first cost for higher all-day efficiency.

Winding Tape Slightly Lower in Price

Cost of Yarn Still High Despite Lower Cotton—Deliveries Improving, with Raw Material Plentiful

A reduction averaging about 15 per cent in the price of the high-grade cotton tapes used in generator and motor windings went into effect in several recent readjustments of quotations by leading producers. Delivery conditions are now considerably improved. Shipments can be made in from six to ten weeks, compared with about twelve to fourteen weeks in the early summer.

The supply of raw material in the hands of the tape manufacturers is on the whole excellent, but the cost of yarn continues high, notwithstanding the slump of cheap grades of cotton in the open market. Leading grades of yarn cost the tape manufacturer around $1.50 to $1.75 per pound today. Wages are not being reduced as yet, and the amount of business on the books of some concerns bids fair to keep the plants going on substantially full time for many weeks. A fair average cost for sizes commonly used would be from $2 to $3 per gross yard, and it is said on good authority that prices will probably not change much until the end of the year, at least. One of the leading manufacturers points out that should prices fall materially before 1921, buyers would be fairly treated as to readjustment.

Cotton sleeving is in heavy demand now, and in order to fill orders night work is being done. One concern is running three daily shifts on this class of production. Eight to ten weeks' delivery is offered. Prices average about $2 per pound, net, with 50 cents per pound extra for colors. Raw material is in good supply and the outlook for the rest of the year is excellent.

Trolley Wheels in Good Demand

Stocks in General Are Not Large, but Deliveries Are Improving—Price Peak Thought Reached, Though Producers Say They Expect No Reduction Soon

Most manufacturers of trolley wheels report a good volume of sales the past year and are finding demand holding up well. In fact, more than one company is booked ahead with a volume of business that will tax capacity for some time to come, it is stated. According to one of the leading interests there has been a trend toward the use of trolley shoes on the part of small lines during the past two years in some parts of the country, notably in the central district. This tendency has not as yet made itself felt appreciably in the trolley wheel business, however, it is stated. On the other hand there are a few manufacturers who claim that electric railways are making their wheels run a longer time without replacements and that buying has consequently not been heavy. Sales in these cases, however, are expected to be larger this month, on behalf of winter equipment.

Conditions vary considerably with regard to the ability of manufacturers to supply the demand. Some producers have been unable to accumulate any surplus supplies of the finished product and are being retarded in their production by non-delivery of raw material which, though plentiful, is not always obtainable when needed. Recently a large maker received a car of metal which had been en route six months. Other trolley wheel producers report favorable stocks on hand, however, and are finding no especial trouble with their raw material supply. One company is short of high class labor, but in general this condition is very greatly improved. More work per man is also being accomplished in some instances.

Deliveries in several representative instances are ranging from about one to three months. In some quarters the time in which orders can be filled is lessening and hope is expressed of eventually cutting it down to two weeks. In rare instances deliveries can be made in normal time. Production in general appears to be favorable. One large maker of trolley wheels increased production 100 per cent last year over 1918, and expects the output to show a further increase during 1920. No recent change in prices is reported. On all sides the opinion is expressed that prices in this line have reached their peak, yet most producers say they expect no reduction in the near future. One company, however, states that as prices are largely governed by the metal market and copper is now at a comparatively low level, the tendency seems to be toward a decline. Others point to the non-ferrous metal prices as comparing favorably with the pre-war level and do not look for any further reductions on that account.

Renewal of Assigned Car Privilege Refused

Despite the lifting of the lake priority order on coal the gas and electric public utilities continue to be very uneasy concerning their coal supply. This is a general condition as indicated by the communications reaching the National Committee on Gas and Electric Service at Washington. In view of the widespread difficulties in obtaining fuel the Interstate Commerce Commission again has been asked to allow the utilities the use of assigned cars. The commission has declined to take that action at present on the ground that the situation throughout the country is not such as to warrant it so doing.

Since the utilities were denied assigned cars the tendency on the part of some of the coal operators has been to give preference to the loading of coal which is to be sold at spot prices rather than delivered on low-priced contracts. With 80 or 90 per cent of their coal requirements under contract, the public utilities are receiving less than 50 per cent of their daily requirements.

Electric Lines Using More Fire Extinguishers

Complete Installations Made on Cars of Some Roads—Deliveries Improved and Production Increasing

More and more are electric railways coming to regard fire extinguishers as a necessary part of their rolling stock equipment, according to large manufacturers of this equipment. Demand from traction companies has been steadily picking up and at present is said to be better than ever before. Recent large orders reported by one manufacturer included the equipping of cars on important electric lines in Albany, Boston and Chicago.

The types most generally used by electric railways are said to be those employing tetrachloride, as this chemical rapidly evaporates and will not harm electrical machinery. One company has recently developed an automatic extinguisher charged with this agent under 120 pounds of air pressure, which it is claimed is meeting with considerable favor. In some instances manufacturers have been behind on filling orders but this condition is now improving. The labor supply is better though some complaint is still heard of insufficiency of skilled workmen. Difficulty in getting brass was formerly experienced but no trouble is now met, it is stated, in securing plenty of brass, copper and chemicals. No cancellations have apparently been received but on the contrary some producers are increasing production. One representative company was recently three months behind in filling orders, but is now caught up to within three or four weeks. Rush orders in this instance can be filled in about two or three days, though in general the time ranges from two to three weeks at present. Another manufacturer is able to make deliveries of extinguishers varying from stock up to one week.

Prices, it is felt, have probably reached their peak, but no reductions may be expected for some time, it is stated, especially while labor costs remain at their present level. Some producers sell on a yearly contract basis, thus further preventing any fluctuation. Prices quoted by one manufacturer of a pump-action refillable fire extinguisher quite largely carried on street cars are $10 for the 1 qt. size, $12 for 1¼ qt., and $14 for the 1½ qt. size, with special discounts from these prices to railways.

Rolling Stock

Muskegon (Mich.) Traction & Lighting Company expected shipment of the safety cars ordered by the company several months ago for service on the Ottawa and Pine Street lines around the first of this month.

Columbus (Ga.) Railroad has received the nine new safety cars mentioned in the issue of May 22, it is announced. They will be put in operation on the Rose Hill line in place of some of the older two-man cars.

The Pacific Electric Railway, Los Angeles, Cal., owing to the amount of freight now being handled, has had to secure two more electric locomotives, according to F. L. Annable, general superintendent. The new locomotives, which make a total of seventeen now operated by the company, are of the 1601 class and are expected to arrive from the shops some time this month.

Pittsburgh (Pa.) Railways, mentioned in the Oct. 23 issue as petitioning the United States District Court through its receivers for permission to purchase 150 double-truck steel cars among other equipment, has been granted permission by the court to purchase a first installment of twenty-five new double-truck, low-floor cars at a cost of $375,000, it is reported. The court order stipulates that the receivers are to pay for the new cars "out of the income of the system."

Track and Roadway

Los Angeles (Cal.) Railway.—The Los Angeles Railway expects to reconstruct its track and improve its pavement at a cost of $1,600,000. Renewal of overhead equipment will cost $300,000.

American Public Service Company, Chicago, Ill.—The property of the Abilene (Tex.) Street Railway, recently purchased by the American Public Service Company, will be completely rehabilitated, including new transmission lines, extensions of existing lines, ballasting of all roadbed and new equipment.

South Covington & Cincinnati Street Railway, Covington, Ky.—The City Commissioners of Newport, Ky., have been notified that a check for $6,718

NEW YORK METAL MARKET PRICES

	Oct. 1, 1920	Nov. 3, 1920
Copper ingots, cents per lb	18.50 to 18 75	15 00
Copper wire base, cents per lb.	21.50 to 22 00	17 50 to 18.00
Lead, cents per lb	7 75	7 25
Nickel cents per lb	43 00	43 00
Zinc, cents per lb.	7.70 to 7.80	7.40
Tin, cents per lb.	42.75	39.50
Aluminum, 98 to 99 per cent, cents per lb.	35.10	33.10

OLD METAL PRICES—NEW YORK

	Oct. 1, 1920	Nov. 3, 1920
Heavy copper, cents per lb.	15.25 to 15.50	12.00 to 13 00
Light copper, cents per lb.	13.00 to 13.25	10.00 to 10 50
Heavy brass, cents per lb.	8.50 to 9.00	6 50 to 7.00
Zinc, cents per lb.	4.50 to 5.00	4 00 to 4.50
Yellow brass, cents per lb.	6.50 to 7.00	5 00 to 5.50
Lead, heavy, cents per lb.	6.50 to 6.75	5.25 to 5 50
Steel car axles, Chicago, per net ton.	33.00 to 34 00	31 00 to 32 00
Old carwheels, Chicago, per gross ton	37 00 to 38 00	33 00 to 34 00
Steel rails (scrap) Chicago, per gross ton.	27.50 to 28.00	22 50 to 23.50
Steel rails (relaying), Chicago, gross ton.	37.50 to 38.50	30 00 to 31 00
Machine shop turnings, Chicago, net ton.	9.00 to 9.50	8 00 to 8 50

ELECTRIC RAILWAY MATERIAL PRICES

	Oct. 1, 1920	Nov. 3, 1920
Rubber-covered wire base, New York, cents per lb	28.00	23 00
Weatherproof wire (100 lb. lots), cents per lb	29.00	23 00
Standard Bessemer Steel Rails, per gross ton	45.00 to 63 00	45 00 to 63 00
Standard open hearth rails, per gross ton	47.00 to 65.00	47 00 to 65.00
T-rail, high (Shanghai), per gross ton, f o b. mill	Nominal	73 00
Rails, girder (grooved), per gross ton, f o b mill	Nominal	88 00
Wire nails, Pittsburgh, cents per lb.	4.25	3.25 to 4.50
Railroad spikes, drive, Pittsburgh base, cents per lb	4.50 to 6.00	4.25 to 5.25
Tie plates (flat type), cents per lb.	4 00	4 00 to 5 00
Tie plates (brace type), cents per lb.	4 00	4 00 to 5.00
Tie rods, Pittsburgh base, cents per lb.	7.00	6.50 to 7 00
Fish plates, cents per lb.	4 00 to 5 00	4 00 to 5 00
Angle bars, cents per lb.	4 00 to 5 00	4 00 to 5 00
Rail bolts and nuts, Pittsburgh base, cents per lb.	6.00 to 7 00	6 00 to 7 00
Steel bars, Pittsburgh, cents per lb	2 35 to 4 00	2.35 to 3 25
Sheet iron, black (24 gage), Pittsburgh, cents per lb.	4.20 to 7 35	4.20 to 6.85
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb.	5.25 to 8.30	5 25 to 8 05
Galvanized barbed wire, Pittsburgh, cents per lb.	4 45	4 45

	Oct. 1, 1920	Nov. 3, 1920
Galvanized wire, ordinary, Pittsburgh, cents per lb.	3 70 to 4.70	3 95 to 4 70
Car window glass (single strength), first three brackets, A quality, New York, discount*	77%	77%
Car window glass (single strength), first three brackets, B quality, New York, discount	77%	77%
Car window glass (double strength, all sizes, AA quality) New York, discount	79%	79%
Waste, wool (according to grade), cents per lb.	17 to 23	15 to 21
Waste, cotton (100 lb. bale), cents per lb.	15 to 17½	15 to 17½
Asphalt, hot (150 tons minimum), per ton delivered	40 00	40.00
Asphalt, cold (150 tons minimum, pkgs. weighed in), per ton.	42 50	42 50
Asphalt, filler, per ton.	40 00	40 00
Cement, New York, per bbl.	5 10	5.10
Linseed oil (raw, 5 bbl lots), New York, per gal.	1 22	1 05 to 1.07
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	1.24	1 07 to 1.09
White lead (100 lb. keg), New York, cents per lb.	15½	15½
Turpentine (bbl. lots), New York, per gal.	1 46	1 17

*These prices are f.o.b. works, with boxing charges extra.

has been drawn by the South Covington & Cincinnati Street Railway as the company's portion of the improvements made on Tenth Avenue. An agreement as to the amount was reached between the commissioners and the representatives of the railway company two weeks ago.

Blue Ridge Development Company, Hickory, N. C.—The engineers of the Blue Ridge Development Company, a recent incorporation, have recently made a report of their survey for an electric railway between Mount Holly and Blowing Rock. W. T. Shipp, general manager of the company, tells the stockholders that the project is well under way and that the possibilities for the road are very promising.

City Electric Company, Albuquerque, N. M.—The City Electric Company plans to construct an interurban electric railway from Albuquerque north along the Albuquerque-Alameda road. The company was incorporated under the laws of Arizona, but having recently filed a foreign corporation statement, it will be permitted to operate in New Mexico.

Public Service Railway, Trenton, N. J.—The Public Service Railway has been requested by the Board of Freeholders of Middlesex County to remove all the trolley poles at Fords, N. J., so that the main street can be paved.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The City Commission of Trenton, N. J., will request the Trenton & Mercer County Traction Corporation to build a spur on North Broad Street, near the Battle Monument, to switch suburban cars for the return trip instead of using the streets in the centre of the city. This action was taken because of the street congestion.

Hamilton (Ont.) Street Railway.—There will be no further railway improvements in the city of Hamilton, Ont., this year, according to the railway commission. It is said there is no chance that the Wentworth Street tracks will be relaid because the municipality is not ready to go ahead with the work of new paving.

Seattle (Wash.) Municipal Railway.—Mayor Caldwell recently vetoed a second Council ordinance on the extension of the Ravenna car line, charging that the change in plan, adding $9,500 to the expense of the extension, was "throwing away so much of the railway bond money." The Mayor vetoed an ordinance recently voting $3,500 to complete the extension on 30th Avenue Northeast to 35th Avenue Northeast, instead of along East 55th Street to 35th Avenue Northeast, but the Council passed the measure over his veto. The bill last vetoed amends the ordinance under which the work originally was taken up, being intended to remove legal difficulties accompanying the change of plan. The Mayor's action has little effect on the general controversy as the work is being halted by litigation on the part of residents along the line.

Power Houses, Shops and Buildings

Los Angeles (Cal.) Railway.—The Los Angeles Railway is planning an extensive construction program. Four new substations will be erected at a cost of $500,000 and one new carhouse which will cost $500,000.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont. — The Niagara, St. Catharines & Toronto Railway is building an addition to its car houses and shops in Welland Avenue. The addition is 100 ft. x 200 ft. The whole carhouse when complete will be 200 ft. x 400 ft. It is of brick and steel with concrete flooring. The machine shop will be in the center of the building.

Trade Notes

American Steam Conveyor Corporation, Chicago, Ill., manufacturer of equipment for handling ashes, soot, coal siftings, etc., announces that C. C. Brinley has joined the company as eastern manager of the trolley carrier department, attached to the New York office.

J. F. Ohmer, president of the Ohmer Fare Register Company of Dayton, Ohio, announces that he has purchased the U. S. Navy Arsenal plant at Dayton, which will eventually be taken over to increase the output of Ohmer registers. The plant covers approximately three acres of ground and includes a power plant of 600-hp. capacity. The main building is of brick construction, five stories high, and 335 x 110 ft.

The Van Dorn Electric Tool Company, Cleveland, Ohio, is marketing in Ohio a new issue of 8 per cent cumulative preferred stock. This company, which makes portable electrically driven tools, was organized in 1913 to take over the tool-making department of the Van Dorn & Dutton Company. Its sales for the last four years ended June 30 were: 1917, $445,997; 1918, $714,705; 1919, $1,031,513; 1920, $1,190,815.

Ford, Bacon & Davis, engineers, at 115 Broadway, New York City, has added to the organization Page Golson, formerly assistant to the president of the Great Western Power Company, and consulting engineer for the Fleishhacker interests and of the western office of C. B. Peters Company, Inc., it is announced. G. R. Kenny, until recently statistician and valuation engineer for the San Joaquin Light & Power Corporation, has also joined the firm in valuation and report and special investigation work. Mr. Kenny was formerly assistant engineer for the Railroad Commission of California.

The Roller-Smith Company, New York City, announces the appointment of L. Brandenburger, 59 West Broadway, Salt Lake City, Utah, as its representative in Utah and parts of Idaho, Wyoming and Montana. Mr. Brandenburger will handle the company's entire line of instruments, meters and circuit breakers in that territory in addition to representing the Wagner Electric Manufacturing Company, the Cutler-Hammer Manufacturing Company, the Delta Star Electric Company, the American Insulated Wire & Cable Company and the Esterline Company. Mr. Brandenburger was formerly with the Telluride Power Company and later its successor, the Utah Power & Light Company. Since 1916 he has been located in Salt Lake City as a manufacturers' agent specializing in electrical apparatus.

Page & Hill Company, Minneapolis, Minn., producer of Northern white and Western red cedar poles, posts, etc., announces that E. C. Stockdale has returned to the company as general sales manager with headquarters in Chicago. Mr. Stockdale previously came to the company in 1914 from Stone & Webster, with whom he was associated as purchasing agent in the construction of power stations and distributing systems for the Minneapolis General Electric Company, and the hydro-electric development at Keokuk, Iowa, for the Mississippi River Power Company. During the war he attained the rank of lieutenant-colonel, being engaged first in the construction division of the army and later in the purchase and supply division. Since the armistice Colonel Stockdale has been representing the army in deliberations with the War Industry Board and the Department of Labor on suspensions and cancellations of existing contracts.

New Advertising Literature

Insulated Wire and Cable. — The Okonite Company, Passaic, N. J., has just published an attractive 104-page illustrated handbook, covering insulated wire and cable.

Splicing Material.—The Okonite Company, Passaic, N. J., has issued a folder entitled "Spliced for Life," on insulating tape, cement and Manson friction tape.

Power Plant.—Dwight P. Robinson & Company, Inc., New York City, have prepared a poster circular containing excellent halftone reproductions of typical power plants designed and constructed by the organization.

Lamp Guards.—Electric Service Supplies Company, Philadelphia, Pa., has issued a new eleven-page bulletin, No. 169, on its portable and stationary types of Keystone lamp guards suitable for railway service.

Commutator Stones.—The Martindale Electric Company, Cleveland, Ohio, has issued a folder describing its "Handy" natural stones and new "Imperial" artificial stones for grinding commutators.

Engineering Service.—Ford, Bacon & Davis, engineers at 115 Broadway, New York City, is distributing pamphlet No. 28 dated Oct. 1, 1920, dealing with the "Service at Cost Plan" for electric railways and offering the services of the company for valuation work.

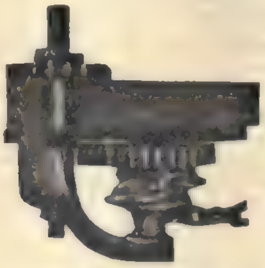
Have You Yourself ever operated a Car equipped with

Peacock Brakes?

Your motormen tell you they are good. Your master mechanic tells you they are good but have you tried them for yourself? It will pay you to do so.

Just a few weeks ago a Receiver told us of his experience with Peacocks and during the conversation said "I was amazed at the ease with which I could handle that car with your brakes and I am not a strong man."

You may not be a strong man but you can easily handle a car equipped with Peacock Brakes. Try it and see. You will then understand why motormen want them.



Type "G" Peacock

NATIONAL BRAKE COMPANY

888 Ellicott Square, Buffalo, New York

Bankers and Engineers

Ford, Bacon & Davis,
Engineers.
115 BROADWAY
NEW YORK

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
43 Exchange Place, New York

STONE & WEBSTER
Incorporated
Design and Construct Steam Power Stations, Water Power Developments, Transmission Lines, Substations, Gas Plants.
NEW YORK BOSTON CHICAGO

JOHN A. BEELER
OPERATING AND RATE INVESTIGATIONS
TRAFFIC SURVEYS AND SCHEDULES
MANAGEMENT - CONSTRUCTION - APPRAISALS
DIFFICULT WORK EXECUTED
52 VANDERBILT AVE., NEW YORK

SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

A. L. DRUM & COMPANY
CONSULTING AND CONSTRUCTING ENGINEERS
VALUATIONS AND FINANCIAL REPORTS
CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS
76 West Monroe St. CHICAGO, ILL.

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
CHICAGO

ENGELHARDT W. HOLST
Consulting Engineer
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation, Reorganization, Operation, Management.
683 Atlantic Ave., Boston, Mass.

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS

WE BUILD TRACKS
Construction—Maintenance—Rehabilitation
ENGEL & HEVENOR
Track Engineers—Contractors
220 Broadway, New York City

REPUBLIC ENGINEERS, INC.
CONSULTING AND CONSTRUCTING ENGINEERS
Valuations *Reports* *Investigations*
Designs *Construction* *Management*
60 BROADWAY, NEW YORK
CLEVELAND, OHIO YOUNGSTOWN, OHIO
Illuminating Bldg. Mahoning Bank Bldg.

ROBERT M. FEUSTEL
CONSULTING ENGINEER
Rate, Traffic and Reorganization Investigations
Fort Wayne, Indiana

C. E. SMITH & CO.
Consulting Engineers
2065-75 Railway Exchange Bldg., St. Louis, Mo.
Chicago Kansas City
Investigations, Appraisals, Expert Testimony, Bridge and Structural Work, Electrification, Grade Crossing Elimination, Foundations, Power Plants

WALTER JACKSON
Consultant
FARES, BUSES, MOTOR TRUCKS
More revenue from *more* riders
143 Crary Ave., Mt. Vernon, N. Y.

HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

Parsons, Klapp, Brinckerhoff & Douglas
WM. BARCLAY PARSONS H. M. BRINCKERHOFF
EUGENE KLAPP W. J. DOUGLAS
Engineers—Constructors—Managers
Hydro-electric, Railway, Light and Industrial Plants, Appraisals and Reports.
CLEVELAND NEW YORK PORTSMOUTH, VA.
Leader News Bldg. 84 Pine St. Ferry Bldg.

Signals of Safety for Safety Car Routes

With the high speed schedules and close headway of the safety car, it is imperative that you use Signals.

The signal best suited to your requirements is the one that is big, reliable and clearly discernible day and night. One so installed that the first car to reach the cut in contactor will have the right of way.

Those signals are U. S. Electric Signals, that prevent instead of cure.

United States Electric Signal Company, West Newton, Massachusetts

Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Service Supply Company, Salford, Eng.

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
Security Building, St. Louis, Mo.

J. L. JACOBS & COMPANY
Engineers—Statisticians
Investigations—Reports—Expert Testimony
Management, Organization and Cost Control
Industrial Relations Problems—Statistical Analyses
Monadnock Building, Chicago

THE P. EDWARD WISH SERVICE
80 Church St. NEW YORK
DETECTIVES
Street Railway Inspection
131 State St. BOSTON

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and Mechanical Testing
80th Street and East End Ave., New York, N. Y.

Scofield Engineering Co.
POWER STATIONS
HYDRAULIC DEVELOPMENTS
Consulting Engineers
PHILADELPHIA, PA.
GAS WORKS
ELECTRIC RAILWAYS

Frederick Sargent
Wm. B. Monroe
A. D. Lundy
James Lyman
SARGENT & LUNDY, *Engineers*
1412 Edison Bldg., 72 W. Adams St., Chicago, Ill.

THE COAL & IRON NATIONAL BANK
of the City of New York

Capital $1,500,000
Surplus $1,000,000 Und. Profits $363,051
Resources $23,743,000

Offers to dealers every facility of a New York Clearing House Bank.

Byllesby
Engineering & Management Corporation
208 S. La Salle Street, Chicago
New York Tacoma

KELLY, COOKE & COMPANY

Engineers

149 BROADWAY
NEW YORK
424 CHESTNUT STREET
PHILADELPHIA

Lackawanna

Deseaming Process

insures uniformly durable rails

because it eliminates weak surface metal,
thus increasing durability of rail head and
preventing dangerous breaks in base.

It is not expedient to renew rails in patches, so defective material in any considerable number of rails is about as objectionable as though *all* the rails were uniformly poor. First class roads invariably renew the track throughout when a considerable number of the individual rails become worn, which means that unless track material is uniformly up to quality and stands up in service there is a big loss.

Rails broken or prematurely worn are no fit for further use in main track, nor even fo cutting up into pieces for frog manufacture owing to lack of confidence in further strength and durability. Such rails can only be used i unimportant side lines or sold for scrap, and if the haul to the melting furnaces is long, th scrap value is practically nothing.

The weak, partially decarburized surface steel of the original ingot is ordinarily finished into the rail, but if hot-milled off the partially formed rail section, at the locations of rail head and base, the finishing rolls complete their work upon clean, solid, high-carbon steel and produce a harder, denser and finer finish. This, in short, explains how the Lackawanna Deseaming Process eliminates seamy bases and soft wearing surfaces. The picture shows the Lackawanna Deseaming Machine at work.

The added safety and life obtainable from Lackawanna Deseame Rails are therefore too important t neglect, especially as test and performance records prove how muc better the material in these rails is.

Rails made by this process hav demonstrated a trustworthiness tha justifies a reduction in the stock o rails kept on hand for replacemen of anticipated failures, and a smalle allowance of spare rails at designate intervals or sections of track.

The longer life and better wearin qualities are highly advantageous n only in lessening the number of r newals but in lessening expense fo men patrolling the track and fo

ALL LACKAWANNA RAILS ARE DESEAMED

inimized work in replacement. These sav-
gs, without jeopardizing protection to
affic, are surprisingly large, especially
here the breaking of ordinarily made rails
s become an epidemic.

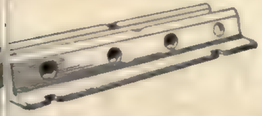
It should be remembered that replacing of
oken or worn rails is additional to the regu-
r work of the section crews. When break-
ges are discovered in day time their removal
d replacement take the section men from
her work; and when reported at night the
en must be called out to work extra hours,
e time and cost of which are disproportion-
e to the amount of work accomplished.
ime is consumed getting to and from the point where the breakage occurs, in transporting spare rails on hand or push cars, and in other work that can not be provided for definitely in advance of an event that is unforeseen.

The high degree of satisfaction of Lackawanna Rails in service, and their enviable records, have demonstrated that Lackawanna Rails have always been highly dependable. Now that we add the advantages of deseaming, without additional cost to the customer, you cannot afford to pass over this matter without at least careful investigation.

Tell us about your rail troubles and we will send interesting literature.

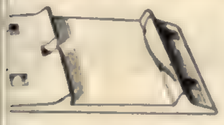
Other Lackawanna Aids to Better Track

The Lackawanna Safety-Head Angle Bar



overcomes liability to wear and fracture by preventing cutting of the bar at the top from back action or upward thrust of the rail ends. This is accomplished by a slight depression in the head of the angle bar for a short space at the center where the rail ends meet.

The Lackawanna Hook-Shoulder Tie Plate



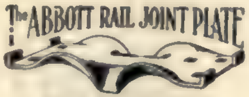
is simple, strong, durable, convenient for installation, and by holding the rail with great security prevents undue wear and destruction of material, saves repair costs and reduces maintenance labor.

Two ribs on top form a channel in which the rail base rests. One of the ribs is plain and the other hooked to make a holder. One
two plain spikes on the plain rib complete the bond between plate
both rail flanges. The plate is fastened to the tie by independent
n or screw spikes. The rail may be removed without disturbing
plate.

Lackawanna Track Bolts and Spikes

Our track bolts and spikes, of all standard sizes for light or heavy rails, enjoy an enviable reputation for careful, accurate workmanship and finish.

The Abbott Rail-Joint Plate



strengthens and otherwise improves ordinary angle bar joints of standard and light tee and girder rails. Its use assures smooth running track surface without the necessity of constantly raising and tamping the joint ties, avoids annoyance and expense from worn and broken bolts and angle bars, and protects the rail ends from battering and breaking down.

The hard steel and combination of reversing flange with the plate provides for internal stresses and imposes the load on the two joint ties with about the same action as between a short deck bridge and its piers. Upturned corner lugs engaging the ends of the angle bars act as anti-creepers and as rail guards to prevent misalignment if the angle bars break or become loose.

Abbott Plates are equally applicable to and advantageous on new or relaid track and will extend the life even of old track for several years.

These plates are made in types especially suitable for ordinary steam railway service, for use in paved streets, and for welding to the rail base, and may be held with either screw or ordinary spikes.

Write for our Booklet

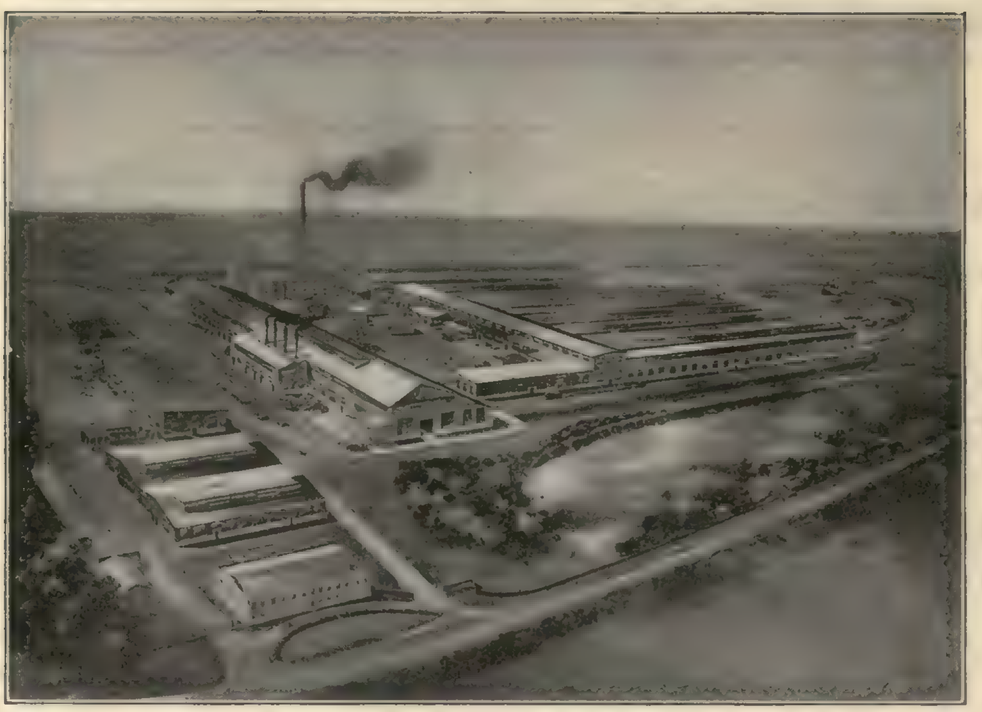
"Improved Track Appliances"

Lackawanna Steel Company

General Sales Office and Works: Lackawanna, N. Y.

anta Boston Buffalo Chicago Cincinnati Cleveland Detroit New York Philadelphia St. Louis San Francisco

Sole Exporter of Our Commercial Products: Consolidated Steel Corporation, 165 Broadway, New York.



Our extensive, modern plant, illustrated on this page, is equipped to fabricate track work of all constructions, Solid Manganese Steel, Manganese Steel Insert, Plain Bolted and Manganese Steel "T" Rail, etc., which coupled with our long experience, places us in a position to supply your needs efficiently.

WHARTON SPECIA

"GIANT HEEL" Switch

SWITCHES—MATE

of Solid Manganese St

Converter and Electric
Steel Castings

WM. WHARTON JR. & CO., INC.

EASTON, PENNA.

"Originators of Manganese Steel Track Work"

SALES OFFICES:

Denver, Colo. *Boston, Mass.* *Philadelphia, Pa.* *San Francisco, Cal.*
New York City *Chicago, Ill.* *Pittsburgh, Pa.* *Scranton, Pa.*

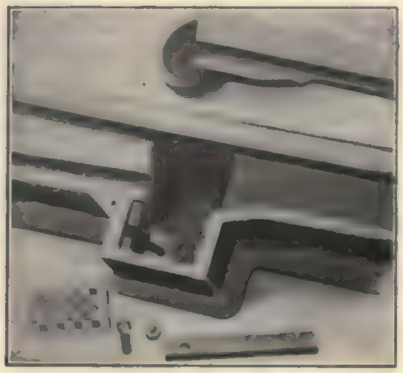
The illustration above gives a comprehensive view of our large Layout Yard, where Special Track Work is assembled and carefully fitted together, to avoid any possibility of trouble during installation. No piece of work leaves our plant without such careful fitting.

TRACK WORK

FROGS—CROSSINGS

nd Manganese Steel Insert

Hammer and Press Forgings
Seamless Steel Gas Cylinders



H. C. B. Switch

Subsidiary of Taylor-Wharton Iron & Steel Co.

High Bridge, N. J.

Other Plants:

TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
PHILADELPHIA ROLL & MACHINE CO., Philadelphia
TIOGA STEEL & IRON CO., Philadelphia

Putting Pulling Power into the Business Paper

FOR the third time since January an *Electrical World* editor is traveling from New York to California in active co-operation with the National Electric Light Association. Three other *Electrical World* editors have made the trip from the Atlantic to the Pacific in the same period, scouring up and down the states between for facts and figures of essential importance to electrical engineering and commercial interests.

Out of the power plant world a demand, multiplied and insistent, comes for information on oil engines. As a result, a noted authority on Diesel and semi-Diesel engines is added to the editorial staff of *Power*. He is sent out to visit all important installations of these engines throughout the country. Over three months of travel and study will be spent by this *Power* editor solely to gain for *Power* readers a fuller knowledge of oil engines operating performance under all possible service applications and conditions.

A McGRAW-HILL man representing *Engineering & Mining Journal*, after having been forced out of Mexico by warring factions, has again plunged into that turbulent country to learn and report actual conditions affecting mining and oil well operations and prospects and equipment opportunities.

An editor of *Ingenieria Internacional* comes back from a long trip through the countries of South America bringing much valuable data on trade conditions, engineering and industrial development, and equipment requirements.

American Machinist recently sent one of its executives on a tour of Europe to study the metal-working industries abroad for the benefit of similar industries and machine-tool manufacturers at home.

An editor of *Engineering News-Record* also has just returned from Europe, where he has been investigating engineering practice and equipment usage and needs in the construction field.

General departure from rule-of-thumb methods is an urgent need of the chemically controlled industries. To this end *Chemical & Metallurgical Engineering* has made an exhaustive investigation on which is founded one of the most significant and important issues of any publication in the engineering and industrial press—the September 8th "Convention" issue of *Chemical & Metallurgical Engineering*.

Electrification of steam rairoads is a question pregnant with transportation improvement possibilities in this country. So an *Electric Railway Journal* editor recently made an extended trip over the system of the Chicago, Milwaukee & St. Paul R.R. to study this famous achievement in railroad development. Returning east this editor made a sweeping tour of Canada, getting data vitally interesting to American electric railway men and builders of electric railway material on today's methods, equipment, plans and outlook of the foremost Canadian electric railways.

The extraordinary success of *Electrical Merchandising* since its inauguration in 1907 is largely due to the indefatigable field work of the editors. These editors comb the continent with their journeys. They are constantly in personal contact with the electrical dealers, jobbers and contractors. They meet them at their conventions, clubs, clambakes, summer camps, offices, stores, warehouses and homes. They are keeping in touch with movements and materials and markets and methods and men—helping these men individually and through their organization.

Industrial, agricultural and commercial development of the West beyond the Rockies depends in large measure on the development of electricity from water power. To promote the industrial development of these great States with their specialized problem, McGRAW-HILL service to the electrical field was expanded in September, 1919, by the purchase of the *Journal of Electricity*. The acquisition of this publication demonstrates that McGRAW-HILL service, when conditions require, is intensive, as well as comprehensive.

As an editor of *Coal Age* recently wrote, "Read your *Coal Age* closely, and you will see that no stone is being left unturned to make *Coal Age* a mirror of the industry, to make the achievements and experience of some enterprising individual somewhere the pivotal point for an advance of the entire craft."

THIS is the policy that governs ALL McGRAW-HILL publications. It picks the ablest men as editors. It sends them out into the fields served by those publications. It bids them seek the problems of those fields. And through their publications these editors lead and co-ordinate the search for the answer to those problems.

That is the kind of service that puts pulling power into a business publication.

That is why McGRAW-HILL publications are dominant in their fields.

That is why they are read —with care and respect—by the biggest men in those fields.

And that is why they exert the influence on those men that makes advertising in McGRAW-HILL publications productive.

McGraw-Hill Company, Inc., Tenth Avenue at 36th Street, New York

American Machinist
Power
Electric Railway Journal
Electrical World
Journal of Electricity
Electrical Merchandising
Engineering News-Record
Coal Age
Engineering & Mining Journal
Ingenieria Internacional
Chemical & Metallurgical Engineering

Send at once
for our new

THERMIT
Rail Welding
Pamphlet
No. 39

SERVICE STRENGTH
THERMIT WELDING
ECONOMY

This pamphlet describes new phases and advantages secured by Thermit Rail Welding which have never been covered in any previous booklet.

The part devoted to Thermit welded frogs and crossings is particularly timely just now as these can be welded in the railway shops during the Winter while out-door track construction is at a standstill.

Let us send you immediately one of our engineers to instruct your men free of charge in making one or two Thermit welded frogs, free of charge except for rail materials and the labor you supply.

METAL & THERMIT
CORPORATION
120 Broadway, New York

Pittsburgh San Francisco
Chicago Boston Toronto

For Turbine Lubrication

Good Oil is a Most Important Factor

A constant stream of clean, cooling oil must be supplied to the bearings at all times. ¶The oil must not emulsify nor form deposit of any kind and must free itself from any moisture entering the system. ¶It must also maintain a uniform quality over long periods of time.

TEXACO REGAL OIL

A special product for a special purpose which meets perfectly turbine conditions

TEXACO REGAL OIL
is only one of the many Texaco Lubricants made for special purposes.

There is a Texaco Lubricant for every mechanical appliance in the shop as well as in the power plant.

Consultation with Texaco Lubrication Engineers regarding any or all of your lubricating requirements is invited.

And don't forget to ask us about Texaco Crater Compound, the Great Gear Lubricant and our Texaco Car Oils.

The Texas Company
Dept. RJ, 17 Battery Pl., N. Y. C.
New York Chicago Houston
Offices in Principal Cities

Strength

Means Long Life

A fuse lasts just as long as its strength holds out. No longer! Don't be sidetracked by beautiful theories and high-sounding talking points. It is *ruggedness* alone—the ability to stand up against repeated blow-outs—that counts.

With this idea in mind we have built a housing of exceptional strength around the fusible element of the "Union" Renewable Fuse.

The casing itself is unusually thick and strong. All the component parts—yoke, washer, cap and ferrule—are constructed with an extra margin of strength. And the ferrule, instead of screwing to the *inside* of the casing, as in ordinary fuses (which subject the casing to the brunt of the blow-out pressure) is screwed and riveted to the *outside* of the casing to reinforce it at every point.

Strength means LONG LIFE—the thing you pay for. And the thing you *get* in a "Union" Renewable Fuse.

Why not let us send you booklet telling about the other superior features of both the Renewable and Non-Renewable types of "Union" Fuses?

Sold by electrical dealers everywhere.

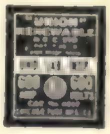
TRADE MARK.

UNION

Chicago Fuse Mfg. Co.

Oldest and largest manufacturers of Fuses, Electrical Protecting Materials and Conduit Fittings

Chicago New York



"UNION"

RENEWABLE FUSES

Collier Service

Standards are being kept

Regardless of the great increases in the cost of materials, artwork, printing, labor and other items, users of Collier Service know that its standards are not only being kept, but even surpassed.

No deterioration is permitted in the quality of the car-card stock or printing; nor a lowering of the artistic standards and originality that have made car-card advertising a respected medium with the shrewdest advertisers of America.

And this adherence to a standard of excellence set by ourselves is matched by faithful adherence to our agreements to pay a fixed sum per month promptly to our electric railway clients, with no attempt whatever to claim indulgence for unforeseen changes in economic conditions.

Barron G. Collier
INCORPORATED

Candler Building, New York

Power

THEW is an embodiment of the highest degree of engineering skill — a skill devoted to building into every unit the last ounce of shovel power. Every shovel is the work of specialists who, for over a quarter of a century have studied the requirements of the various fields in which power shovels may be used.

Inbred worth, coupled with unusually rugged operative power obtain for Thew owners permanent, dependable shovel service.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

Thew
Power Shovels

The Ideal Equipment for City or Interurban Cars

Agasote
(Trade Mark)
For Roofing—Headlining—Wainscoting

Pantasote
(Trade Mark)
For Curtains

Better Service at Lower Cost

The Chicago Surface Lines in specifying Agasote on its new trailers for headlining know the actual SERVICE that this material will give.

On this property, as well as on hundreds of others there is ample evidence of the superiority of Pantasote curtains and Agasote roofing over all others.

Agasote for roofing will outwear wood many times. It is absolutely waterproof to start with and it stays that way.

In case of accident it is easily and rapidly patched.

Old-fashioned curtains wear out quickly. They are made of flimsy material, easily torn, stained and discolored.

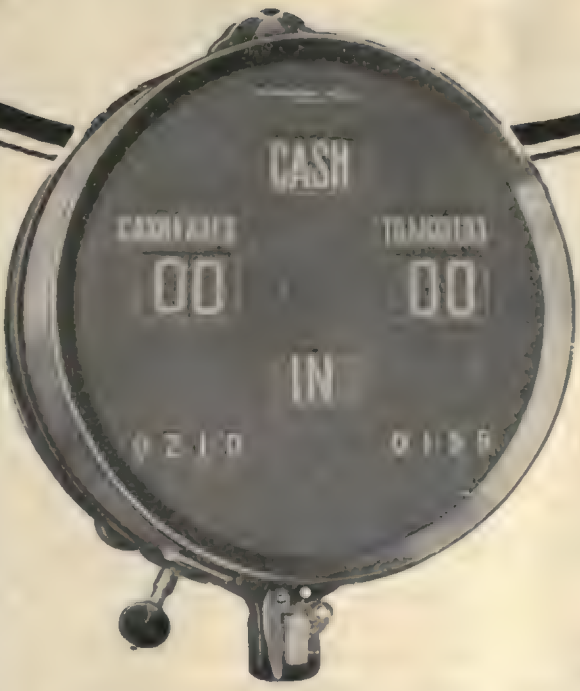
Pantasote Curtains wear a great many times longer; are made tough and not easily torn. When washed they look as good as new.

RESULT

Economy ***Light-weight*** ***Durability***

THE PANTASOTE COMPANY

11 Broadway, N. Y. People's Gas Bldg., Chicago, Ill. 751 Monadnock Bldg., San Francisco, Calif.



Accurate Fare Collection under all Conditions

Among the large roads entirely equipped with International Type single registers are the Chicago and Philadelphia Systems.

Changing rates of fare, odd cent fares, impose no difficulties in the operation of a collection system based upon International Registers. The system is just as effective, with all the accuracy and completeness of collection, no matter how frequent the fare change.

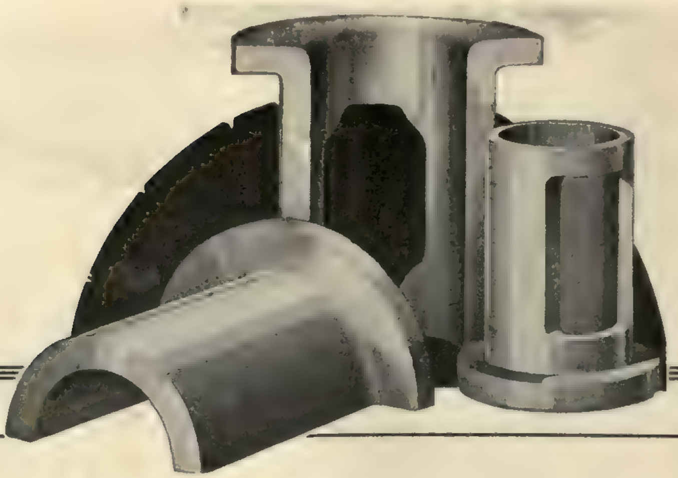
The final check upon load and receipts is only complete with the visible and audible registration afforded by these registers. They give a check upon fare boxes, or other adjuncts to the collection system which can be had in no other way.

Single and double registers, counters and fittings are made for every requirement. Advice upon registration problems gladly given.

The International Register Company

Manufacturers of Fare Registers and Railway Supplies, and General Selling Agents for HEEREN ENAMEL BADGES.

Office and Factory:
15 So. Throop Street, Chicago, Illinois



—lowest in ultimate cost

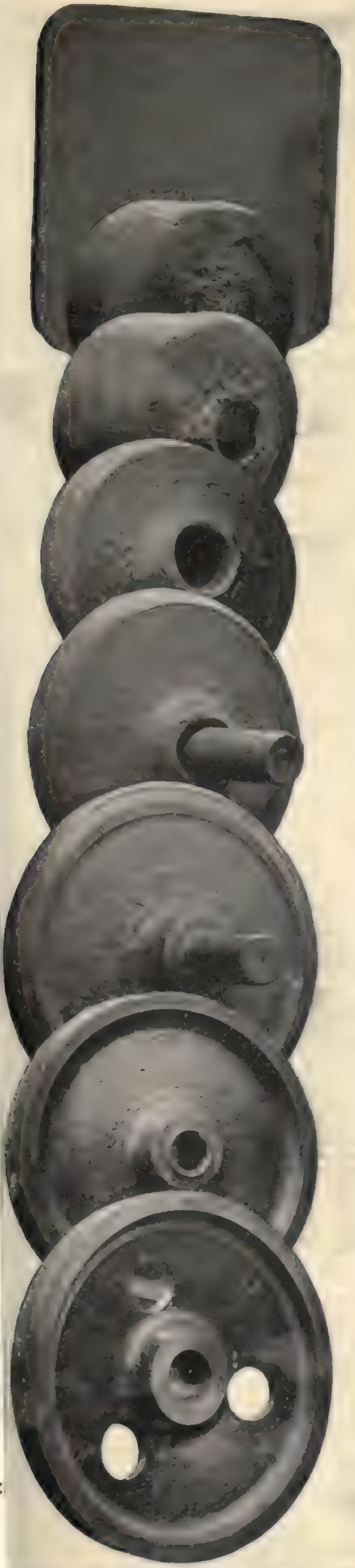
BUY your axle and armature bearings on the basis of the service they will render, and you'll find that even though the purchase price is a trifle higher, they will be lowest in ultimate cost.

Tiger Bronze Axle and Armature Bearings are not made to sell at a low price, yet they actually cost less than ordinary bearings because of the remarkably consistent, low-cost service which they render. They reduce to a minimum the laying up of cars for bearing renewals and the rewinding of armature coils. They are helping to reduce operating expense and maintenance costs on some of the most progressive electric railways in this country.

It will pay you to investigate the money saving possibilities of Tiger Bronze Bearings and to learn more about the engineering service that goes with them. Write today for details.

MORE-JONES BRASS & METAL CO.
ST. LOUIS, MISSOURI

"TIGER" BRONZE AXLE and ARMATURI
BEARINGS



The Reasons Why

Rolled and Forged Circular Sections

made by our special methods should be specified

Told in Five Chapters

CHAPTER II

An Important Consideration

The ingots used in making our circular sections are rolled longitudinally. This means that any piping or segregation remains at the center of the cross-section of the bloom and hence at the center of the blocks sheared from the bloom. The importance of this will be very apparent when subsequent steps in our method of manufacture are described.

After the blocks have been sheared it is necessary to pierce them for the insertion of a mandrel or rolling pin. This holds the block in position in the machine which does the actual rolling and hydraulic forging that brings the piece to the desired shape. The third of the eight scale photographs at the left side of this page shows a block which has been pierced.

Next week the machine itself will be described.

TURBINE BUCKET WHEEL

ROUGH TURNED GEAR BLANK

STREET CAR WHEEL

AUTOMOBILE FLYWHEEL BLANK

SHAFT COUPLING

Uniform Circular Sections

of many kinds can be made by our special methods. A few of these are listed below:

Automobile Flywheel Blanks
Car Wheels
Crane Track Wheels
Gear Blanks
Industrial Wheels
Shaft Coupling Blanks
Turbine Discs

Write for detailed information.
Also watch for next week's advertisement.

Midvale Steel and Ordnance Company
Cambria Steel Company

General Sales Office, Widener Building, Philadelphia, Pa.

District Sales Offices
Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia
Pittsburgh, San Francisco, Salt Lake City, Seattle, St. Louis

Sole Export Representatives
Consolidated Steel Corporation, 165 Broadway, New York
All export inquiries should be sent to this address

49

The map above shows the location of the 49 foundries in the United States and Canada represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago 3
St.Louis 2
Buffalo 4
Pittsburg 2
Cleveland 2
Amherst N.S.
Montreal
Mich. City. Ind.
Louisville.
Mt. Vernon Ill.
Ft Wayne. Ind
Birmingham
Atlanta
Savannah
Boston
Detroit
St. Paul.
Kansas City. Kan
Denver
Tacoma
Rochester N.Y.
Sayre. Pa.
Lime Rock. Conn
Albany.
Toronto.
New Glasgow N.S.
Madison. Ill
Berwick Pa
Huntingdon. W. Va.
Wilmington Del
Houston Tex
Hannibal Mo
Reading Pa
Baltimore
Richmond Va.
Ft William Ont
St Thomas
Hamilton
Ramapo. N.Y.
Marshall. Tex
Los Angeles

Capacity
20,000

CHILLED IRON WHEELS

Per Day
25 Million in Service

Association of Manufacturers
of Chilled Car Wheels
847 McCormick Bldg. Chicago

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

S BRAND *"The 'Standard' Brand on your material is an assurance of eventual economy."* S BRAND

STANDARD STEEL WORKS CO.

GENERAL OFFICES:

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ST. LOUIS
HAVANA, CUBA

RICHMOND
SAN FRANCISCO
NEW YORK
MONTEREY, MEX.

MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

You Can Minimize Overhead Repair Work

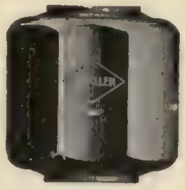
and successfully cut maintenance costs if you turn to

The Macallen Line

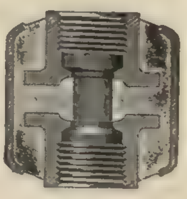
of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.



The Macallen Insulating Joint



Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.

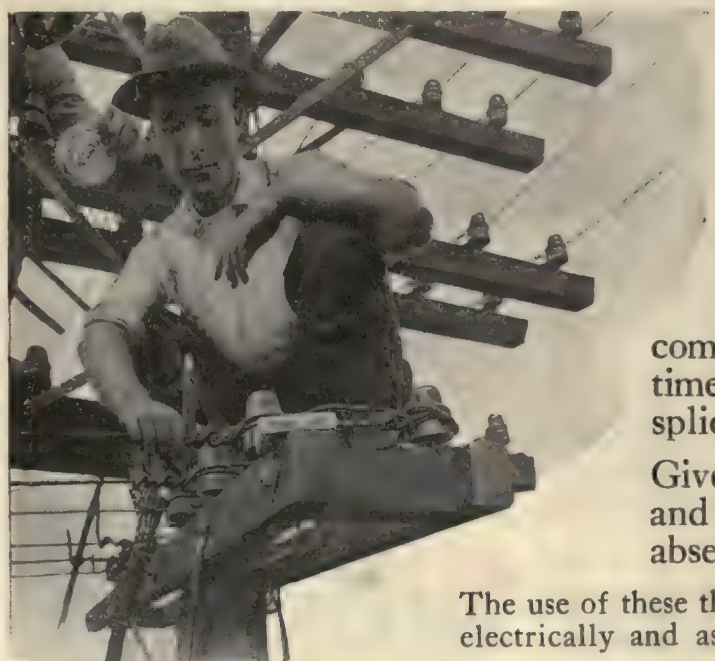
May We Send Our Catalog?

TRADE MACALLEN MARK.

The Macallen Company

Macallen and Foundry Sts., Boston

TRADE MACALLEN MARK.



A Good Workman

commands high wages. Why waste his time and your money with inferior splicing materials.

Give him Okonite and Manson Tapes and Okonite Cement to use and note the absence of joint failures.

The use of these three insure joints which will be as strong electrically and as long lived as the insulated wire itself.

Write for full particulars

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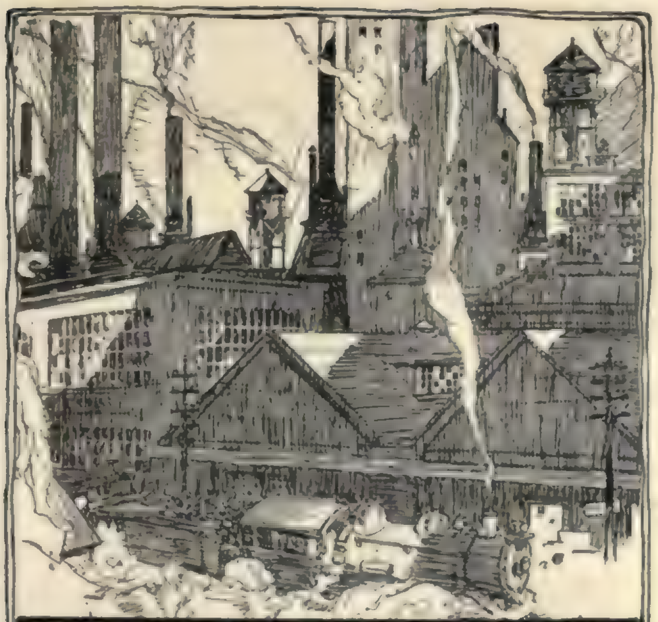
Incorporated 1884

CENTRAL ELECTRIC Co., Chicago, Ill., General Western Agents

Pettingell-Andrews Co., Boston, Mass. Novelty Electric Co., Philadelphia, Pa.
F. D. Lawrence Co., Cincinnati, O.

OKONITE
TRADE MARK



ECONOMY *renewable* FUSES

Knife-blade type Economy Fuse

Industries persisting in the use of "one-time" fuses pay more for electrical protection than those equipped with Economy Fuses.

The famous Economy "Drop Out" Renewal Link makes possible an annual saving of 80% in fuse maintenance costs.

Nothing is destroyed when an Economy Fuse blows but the inexpensive strip of fusible metal.

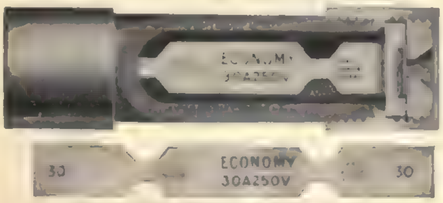
This is quickly and easily replaced with a new "Drop Out" Renewal Link without delay to men or machinery. The heavy cartridge, end caps and the winged washers which lock the fuse are virtually indestructible and are used again and again.

Check up fuse costs in your plant. And remember that Economy Fuses give maximum protection at minimum cost.

For sale by all leading electrical jobbers and dealers.

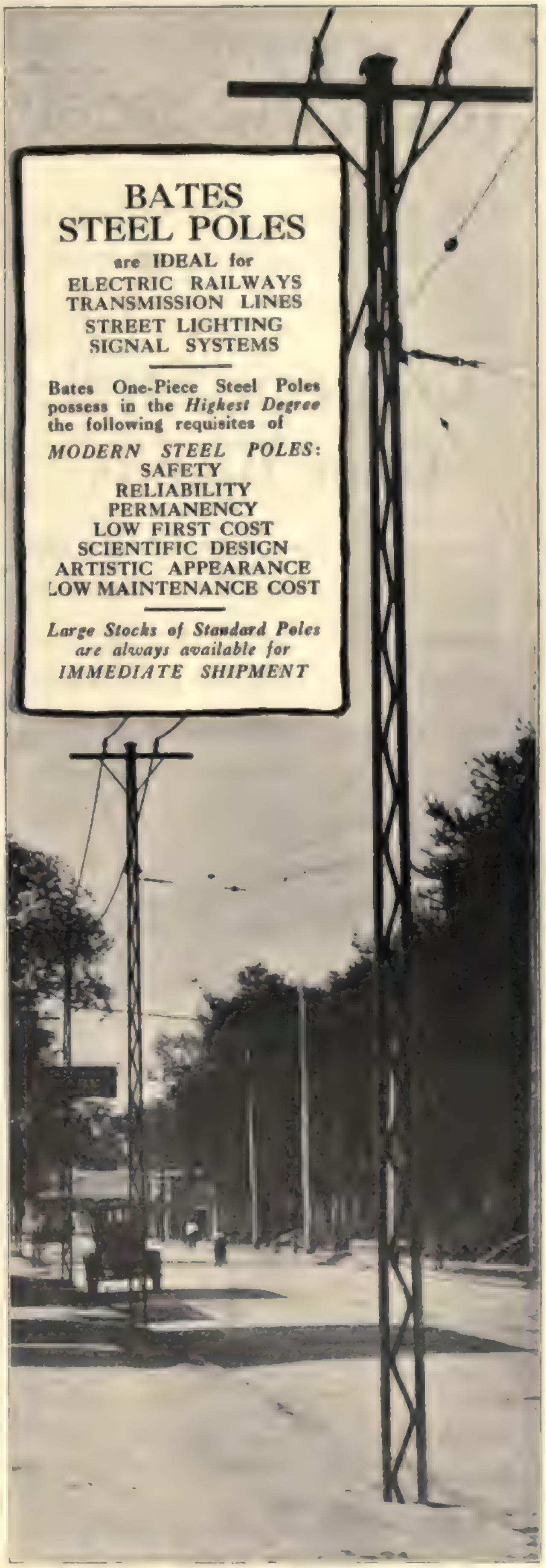
Economy Fuse & Mfg. Co., Chicago, U. S. A.

Economy Fuses are also made in Canada at Montreal



Ferrule type Fuses with Economy "Drop Out" Renewal Link

Economy Fuses were the first line using inexpensive bare links for restoring blown fuses to their original efficiency to be APPROVED IN ALL CAPACITIES by the Underwriter's Laboratories.



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are IDEAL for
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CHICAGO, ILLINOIS

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Gear performance is determined to a great extent by the quality of steel of which they are made.

Carnegie Steel Gear Blanks

are made of special steel under the supervision of trained metallurgical engineers. A special forging and rolling process impart to these blanks unusual wearing qualities. Gears cut from Carnegie Blanks when properly heat treated will outwear cast steel gears three to seven times.

Although their initial cost is a trifle higher, their ultimate cost is less, considering length of service, and quality of that service. Added to this, the number of breakdowns and consequent holdups to production are proportionately decreased, a point well worth consideration.

Engineers of Carnegie Steel Company will gladly consult with you as to your requirements. Your correspondence is invited.

Carnegie Steel Company
General Offices: Carnegie Building, Pittsburgh, Pa.

1388

A time and labor saver

The Erico Portable Railbonding Apparatus is the speediest and most economical apparatus for the purpose.

In case of pick up work—a few bonds to install here and there—two men follow after the section gang with a light outfit that can be cleared at a moment's notice, and pick up the gaps in the return circuit.

And for straight away bonding, 100 bonds a day may readily be installed.

Write for complete data and prices.

Electric Railway Improvement Co.
Cleveland, Ohio

You Can Bend Rails Quickly and Economically With a Watson-Stillman Hydraulic Rail Bender

Hydraulic Portable Rail Bender

The portable rail bender shown herewith is designed for use on the road. It is equipped with interchangeable formed bending blocks, and will make any bend without buckling. The hinged yoke permits the rails to be put in sidewise. It can also be used for other heavy bending.

We build many other handy tools for the railway shop. Such as: Crank Pin Presses, Wheel Presses, Forcing Presses, Forging Presses, Jacks, Pit Jacks, Punches, Shears, Pumps, Accumulators, etc.

Write for Catalogs.

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Chicago: McCormick Building **Philadelphia: Widener Building**

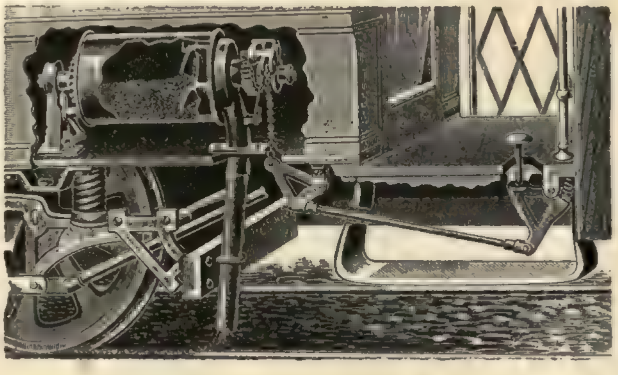
Cleveland Window Catch

THIS photograph shows the extremely simple construction of the Cleveland Window Catch. No springs—no delicate parts to get out of order and cause trouble. It prevents the window from falling and eliminates broken glass and cracked sashes.

Write today for sample order, or, if you prefer send for complete data and prices

The Advance Manufacturing and Tool Co.,
Cleveland, Ohio

Protect Your Public—



by Installing the Sprague Rotary Track Sander

Slush and rain are of no avail against this rugged sander. Accidents are bound to occur on slippery rails. They cannot happen if your rails are properly sanded.

When the foot plunger goes down sand is deposited on the rail just where it will prove most effective. The sand cannot pack because of the rotary motion of the chamber.

It cannot clog nor can it leak and enter the bearings. *Order them now.*

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PHILADELPHIA: 429 Real Estate Trust Bldg.
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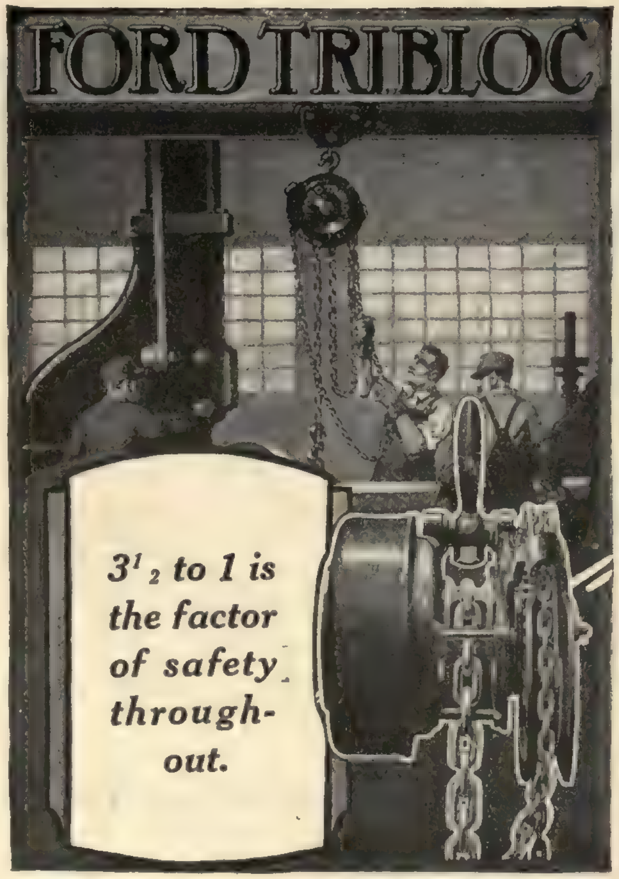
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3½ to 1 is the factor of safety throughout.

—*as a matter of course*

Lifting and carrying is but an incident in your manufacturing operations. Your men accept it *as a matter of course*. In holding a bar of steel for the drop forge, or loading a case onto a truck, the chain hoist must be dependable, for the men are not *expecting* trouble.

The FORD TRIBLOC has earned this confidence. Its Loop Hand Chain Guide prevents gagging—its excellent material insures long life—its high-test steel chain and hooks avoid accident—its 3½ to 1 factor of safety guarantees capacity.

Any size, up to 20 tons—and more—can be provided. Also worm-gear and differential hoists, and special types for special requirements. Full information will be sent in response to your letter.

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OVER-SEAS REPRESENTATIVE
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2176-D

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Hensley better-made trolley wheels of "Resisto" Bronze permit us to guarantee its performance.

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All of our plants have adequate facilities for fitting wheels to axles

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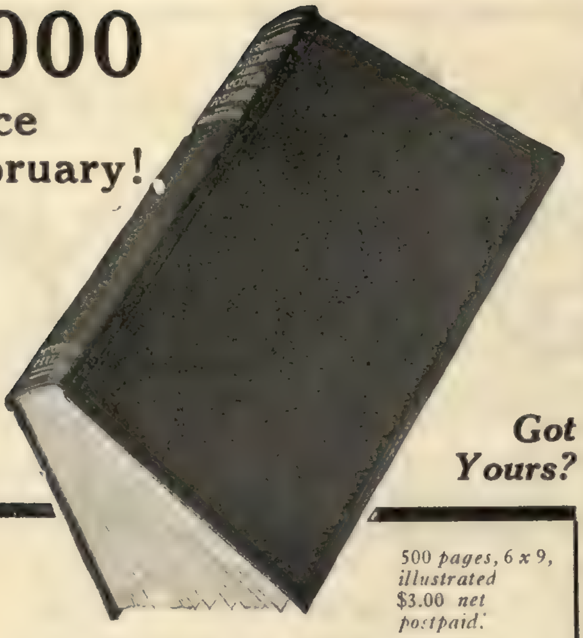

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1220 are operated by Companies
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The New Van Dorn Light-Weight Car-and-Air Coupler

Especially Adapted for Trailer Operation Over City Lines

Van Dorn No. 1450

Light-Weight, Radial Car-and-Air Coupler
Vertical Pivoting — Tight-Lock
Equipped with No. 1264 Draft Gear

Light-weight construction—attained without sacrifice of strength or durability—results in low-cost, economical, long-lived Couplers. This feature is pre-eminent in the new Van Dorn No. 1450 Car-and-Air Coupler.

Double Tight-Locking Device makes coupling positive and certain, and all possibility of wear is eliminated by the "take-up" of the eccentric locking feature.

Vertical Pivoting Head relieves platform strains at sharp changes in grade.

Spring Head Support holds Coupler at proper height for coupling, and allows flexible vertical movement in operation.

Coupler may be unlocked from within the car by means of an air cylinder attached to head, or manually by easily accessible levers.

Van Dorn No. 1450 Car-and-Air Coupler was especially designed to meet the exacting requirements of trailer operation over city lines having curves of as short a radius as 35 feet.

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2325 South Paulina Street, CHICAGO, ILLINOIS

Fire only caused slight delay in production.

Already shipping cars.

Send us your inquiries.

ST. LOUIS CAR CO.

"Birthplace of the Safety Car"

Nuttall Helical Gears

A PROVEN SUCCESS

NUTTAL Form 15-C Trolley Base

Application Is Proof of Quality

Keep your eye on the modern types of street railway cars and you will notice that many Nuttall trolley bases are used.

The form 15-C has a wide application, particularly in city service.

R.D.NUTTALL COMPANY
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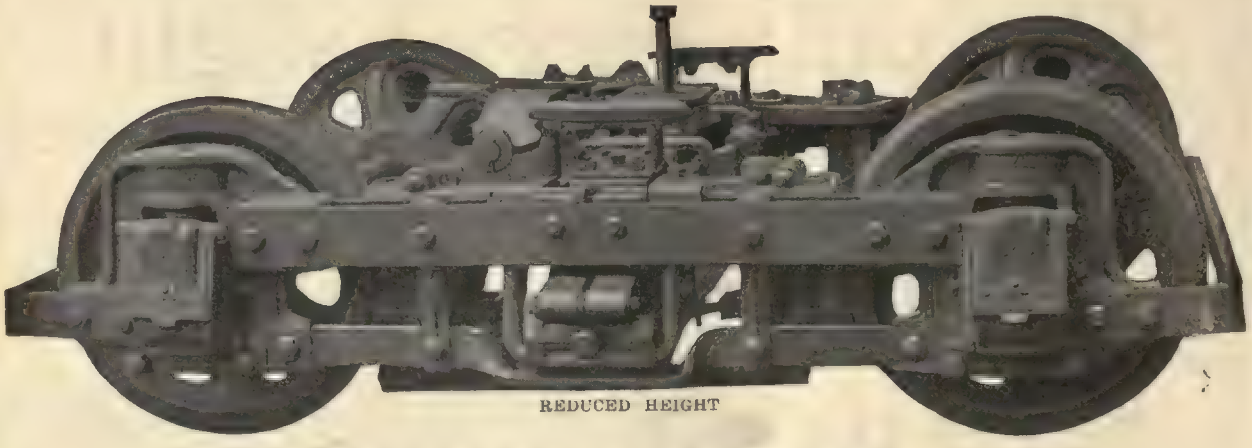
TAYLOR REDUCED HEIGHT TRUCK



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Mounted on 26-in. Wheels with Springs Over Journal Boxes.
Designed to Mount Centre and End Entrance Cars Low Down.

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Wheel Base 5 ft. 2 in. For Car Bodies weighing 16,000 to 22,000 lb. Motors Inside Hung.

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signal (sig′nal), *a.* Distinguished from the ordinary; extraordinary; conspicuous.

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Peirce Forged Steel Pins
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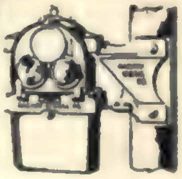

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Copperweld Bond Wires have the strength of steel and the durability of copper. They reduce maintenance costs, are far superior to galvanized bonds, and cost less than copper bonds. Write for catalogue No. 22.

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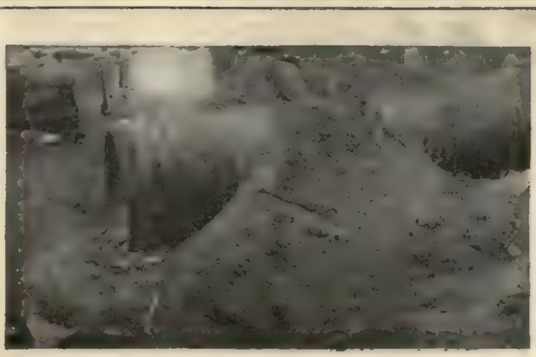
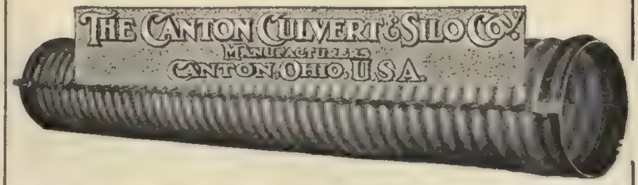
STEEL SALES CORPORATION CHICAGO ILL



Heating sand or gravel for winter concreting

A simple and inexpensive way is to use a piece of corrugated culvert. The sand or gravel is heaped on top and a fire is built in one end. The other end is left open so as to create a draft. In a short time the materials are heated to a temperature far above that required for good mixing.

For this purpose, we can furnish either "Imperial" Riveted Culverts (as shown above) or "ACME" (Nestable) Corrugated Culverts.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SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
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Standard Underground Cable Co.

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TRADE MARK STANDARD UNDERGROUND CABLE CO.

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Copper Wire
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Commutators, Trolley Wheels, Sleet Trolley Wheels, Trolley Ears, Line Material, Controller Fingers, Brush Holders, etc.

We make quality goods.

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Automatic Safety and Automatic Return Switch Stands for Passing Sidings. Tee Rail Special Work for Interurban Lines and Private Rights of Way. **Manganese Construction a Specialty.**

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THE Blaw Speedster Bucket is the fastest rehandling bucket on the market.

This speed in operation, coupled with its great scoop capacity and ability to pick up a full load at every grab, make it an ideal bucket for use at storage piles, etc.; rehandling coal, sand, stone and other loose bulk materials.

Sturdy construction, no S bends in the reeving and all working parts amply protected against abrasive action, insure long life and economy in maintenance.

Made in many sizes, applicable to nearly every type of hoisting equipment.

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Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
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ESTIMATES PROMPTLY FURNISHED

SPECIALISTS
in the
Design and Manufacture
of
Standard—Insulated—and Compromise Rail Joints.

The Rail Joint Company
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Dependable Track Work for Electric Railways

Frogs, Switches, Switch Stands, Crossings, Special Track Work, Machine and Drop Forgings, Pressed Steel and Hammer Work. Foundry for Manganese Steel Castings and special facilities for heat treating. Let us bid on your requirements.

ST. LOUIS FROG & SWITCH CO.
ST. LOUIS, MO.

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The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods. The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate.

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THE TERRY TURBINE
For Driving Your Auxiliaries
TERRY STEAM TURBINE CO.
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WATER PURIFICATION SYSTEMS
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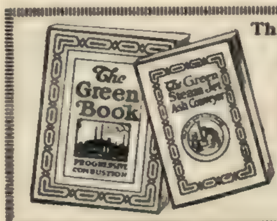

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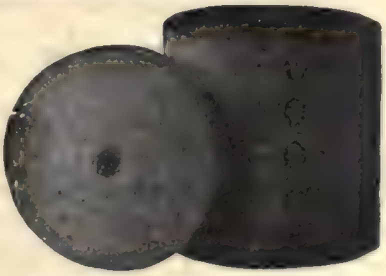

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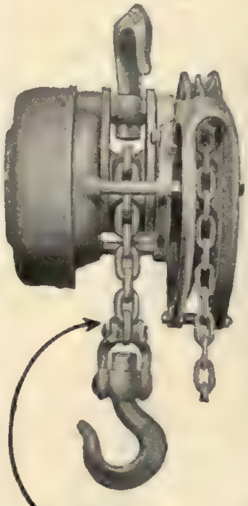

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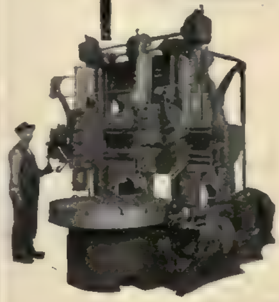

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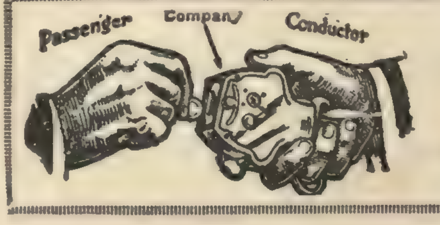

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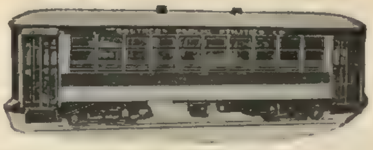

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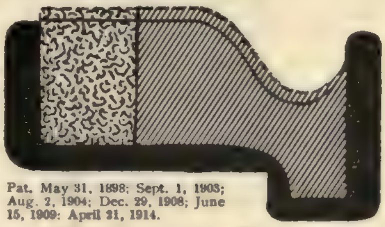

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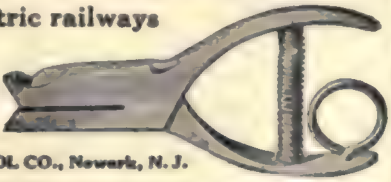

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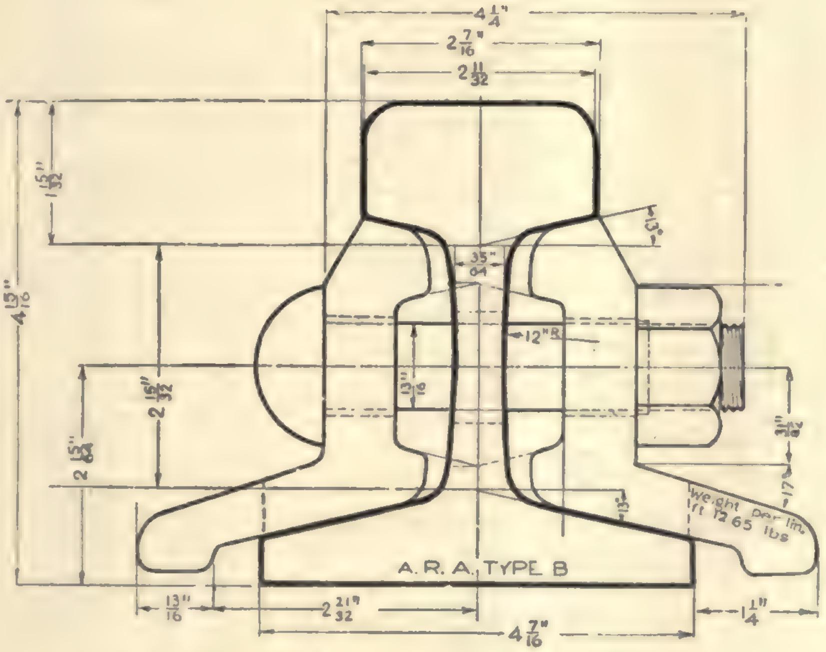

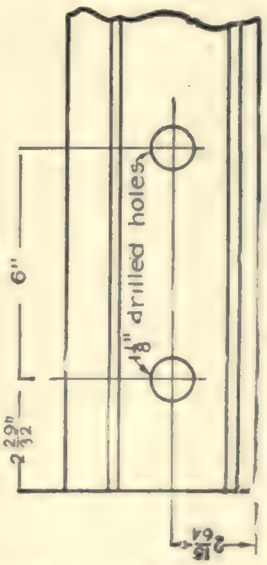

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Benders, Rail
Niles-Bement-Pond Co.
Watson-Stillman Co.
Zelnicker, Walter A., Supply Co Inc.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & M. Co.

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes—Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Creaghead Eng. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Railway Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Metropolitan Vickers Electrical Co., Ltd.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Traction Brake Co.

Bricks, Fire
Green Engineering Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Morganite Brush Co.
United States Graphite Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Buckets
Blaw-Knox Co.

Bushings, Case Hardened & Manganese
Bemis Car Truck Co.
National Metal Molding Co.

Bushings, Graphite & Wooden
Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Carbon Brushes. (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Midvale Steel & Ordnance Co.
National Railway Appliance Co.
Thomas, Perley A.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Car, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Funnel
Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.
Wharton, Jr. & Co., Inc., Wm.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Earll, Chas. I.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Circuit Breakers
Automatic Reclosing Circuit Breaker Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers Track—(See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling—(See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. B. Co

Compressors, Gas
Ingersoll-Rand Co.

Concrete Mixers
Blaw-Knox Co.

Condensers
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.
National Metal Molding Co.

Conduits, Underground
Standard Underground Cable Co.

Connectors, Solderless
Frankel Connector Co.
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Eureka Co.
Russell Mfg. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
Portable Machinery Co.

Conveyors, Coal & Ash
Green Eng. Co.
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Green Engrg. Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.

Cranes
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.
Toledo Bridge & Crane Co., The

Creosote
Barrett Co., The

Creosoting. (See Wood Preservatives)

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings, Frogs and Switches
Wharton, Jr. & Co., Inc., Wm.

Crossing Signals. (See Signals, Crossing)

Crossings, Track. (See Track, Special Work)

Culverts
Canton Culvert & Silo Co.
Stark Rolling Mill Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Supplies Co.
Pantasote Co.

Cutouts
Chicago Fuse Mfg. Co.

Dealers' Machinery
Archer & Baldwin
Cleveland Armature Wks.
Electric Equipment Co.
Foster Co., L. B.
Griswold Machine Co., Geo. M.
Hyman Michaels Co.
Zelnicker Supply Co., Inc., Walter A.

Derailing Devices. (See also Track Work)
Cleveland Frog & Crossing Co.

Destination Signs
Columbia M. W. & M. I. Co.
Creaghead Eng. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging. (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Drinking Cups, Sanitary Paper
Individual Drinking Cup Co., Inc.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Walter A., Inc.

Electrical Wires and Cables
Roebling's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co., The
Byllesby & Co., H. M.
Clark Management Corp., E. W.
Drum & Co., A. L.
Engel & Hevener
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jackson, Walter
Jacobs & Co., J. L.
Kelly Cook & Co.
Parsons, Klapp, Brinkerhoff & Douglas
Republic Engineers, Inc.
Richey, Albert S.

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Portable Potential Transformers

have been designed to obtain the high degree of accuracy that is possessed by Western Portable Indicating Instruments assuring an accurate working combination suitable for precision measurements.

Model 311 Transformer is made for a secondary voltage of 150 volts with proportionate primary voltage in three combinations of two ranges each. The ranges are readily changed by means of links located on the insulated top of the Transformer.

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Weston Electrical Instrument Company

21 Weston Ave., Newark, N. J.

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San Francisco
Denver
Cincinnati
Pittsburgh
Richmond

Model 311
Portable Potential Transformer

Buffalo
Minneapolis
New Orleans
Jacksonville
Seattle
Toronto
Montreal
Halifax
Winnipeg
Vancouver
Calgary, Alta.

Sanderson & Porter
Sargent & Lundy
Scofield Engineering Co.
Stone & Webster

Engines, Gas, Oil and Steam
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Expansion Joints, Track
Wharton, Jr. & Co., Inc., Wm.

Fabricated Steel
Blaw-Knox Co.

Fare Boxes
Brill Co., The J. G.
Cleveland Fare Box Co.
Johnson Fare Box Co.
National Railway Appliance Co.

Feed Water Heating
Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Star Brass Works.

Fibre and Fibre Tubing
Continental Fibre Co.
Westinghouse Elec. & Mfg. Co.

Field Coils. (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Flaxlinum Insulation
National Railway Appliance Co.

Floodlights
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.

Flooring, Grating
Irving Iron Wks.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track. (See Track Work)

Fuses and Fuse Boxes
Chicago Fuse Mfg. Co.
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General Electric Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Columbia M. W. & M. I. Co.
Economy Fuse Mfg. Co.
General Electric Co.

Gages, Oil and Water
Ohio Brass Co.

Gaskets
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Carnegie Steel Co.
Standard Steel Works Co.

Gear Cases
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Electric Service Supplies Co.
Westinghouse Elec. & Mfg. Co.

Gears and Pinions
Bemis Car Truck Co.
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Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co. R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
English Electric Co., Ltd.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gongs. (See Bells and Gongs)

Grates, Chain
Green Eng. Co.

Greases. (See Lubricants)

Grinders and Grinding Supplies
Metal & Thermit Corp.
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
More-Jones B. & M. Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Pantasote Co.

WHAT AND WHERE TO BUY

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co
National Railway Appliance Co
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

Hoists and Lifts
Columbia M. W. & M. I. Co
Ford-Chain Block Co.
Niles-Bement-Pond Co
Yale & Towne Mfg. Co

Hose
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Hydraulic Machinery
Niles-Bement-Pond Co.
Watson-Stillman Co.

Injectors
Schutte & Koerting Co.

Inspection
Electrical Testing Lab's

Instruments, Measuring, Testing and Recording
Economy Electric Devices Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec'l Instrument Co.

Insulating Cloth, Paper and Tape
Anchor Webbing Co.
General Electric Co.
Hope Webbing Co.
Okonite Co., The
Standard Underground Cable Co.
U. S. Rubber Co.
Westinghouse Elec. & Mfg. Co.

Insulating Machinery
American Insulating Machinery Co.

Insulation. (See also Paints)
Anderson M. Co., A. & J. M.
Drew Electric & Mfg. Co.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Mitchell-Rand Mfg. Co.
Okonite Co., The
U. S. Rubber Co.
Westinghouse Elec. & Mfg. Co.

Insulators. (See also Line Material)
Anderson M. Co., A. & J. M.
Creaghead Engineering Co.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co
Electric Service Supplies Co
General Electric Co.
Macallen Co., The
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co

Insulator Pins
Electric Service Supplies Co
Hubbard & Co.

Inventions Developed & Perfected
Peters & Co., G. D.

Jacks. (See also Cranes, Hoists and Lifts)
Brill Co., The J. G.
Buckeye Jack Mfg. Co
Columbia M. W. & M I Co
National Ry. Appliance Co.
Watson-Stillman Co.

Joints, Rail
Carnegie Steel Co
Lackawanna Steel Co.
Rail Joint Co., The
Zelnicker Supply Company, Inc., Walter A.

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.

Junction Boxes
Standard Underground Cable Co.

Laboratories
Electric Testing Lab's

Lamp Guards and Fixtures
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent. (See also Headlights)
Anderson M. Co., A. & J. M.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
Ohio Brass Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
Niles-Bement-Pond Co

Lightning Protection
Anderson M. Co. A & J M
Electric Service Supplies Co
General Electric Co.
Ohio Brass Co
Westinghouse Elec. & Mfg. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
Anderson M. Co., A. & J. M.
Archbold Brady Co.
Columbia M. W. & M. I. Co.
Creaghead Eng. Co.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co
Electric Service Supplies Co
English Electric Co., Ltd.
Eureka Co.
General Electric Co.
Hubbard & Co.
Macallen Co., The
More-Jones B. & M. Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg Co

Loaders, Wagon, Truck or Car
Portable Machinery Co.

Locking Spring Boxes
Wharton, Jr. & Co., Inc., Wm

Locomotives, Electric
Brill Co., The J. G.
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & Mfg. Co

Lubricating Engineers
Galena-Signal Oil Co.
Texas Co., The

Lubricants, Oil and Grease
Borne, Scrymser Co.
Galena-Signal Oil Co.
Texas Co., The

Lumber. (See Poles, Ties, etc.)

Machine Tools
Columbia M. W. & M. I. Co
Niles-Bement-Pond Co.
Watson-Stillman Co.

Magnetic Wire
Belden Mfg. Co.

Manganese Steel, Special Track Work
Wharton, Jr. & Co., Inc., Wm.

Meters, Car, Watt-Hour
Economy Electric Devices Co.

Meters. (See Instruments)
Electric Service Supplies Co

Mica
Macallen Co., The

Mirrors for Motormen
Drew Elec. & Mfg. Co

Molding—Metal
National Metal Molding Co.

Molded Insulations & Parts
Belden Mfg. Co.

Motormen's Seats
Electric Service Supplies Co
Wood Co., Chas. N.

Motors, Electric
English Electric Co., Ltd
General Electric Co.
Westinghouse Elec. & Mfg. Co

Motor and Generator Sets
General Electric Co.

Nuts and Bolts
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co
Lackawanna Steel Co.

Ohmmeters
Weston Elec'l Instrument Co.

Oil Burning Equipment
Schutte & Koerting Co.

Oils. (See Lubricants)

Oxy-Acetylene. (See Cutting Apparatus, Oxy-Acetylene)

Packing
Power Specialty Co.
U. S. Rubber Co.
Westinghouse Traction Brake Co

Paints and Varnishes (Insulating)
Mitchell-Rand Mfg. Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.

Paving Material
American Brake Shoe & Fdry. Co
Barrett Co., The

Paving Pitch
Barrett Co., The

Pickups, Trolley Wire
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pulleys
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions. (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Traction Brake Co

Pipe
National Tube Co.

Pipe Fittings
Power Specialty Co.
Standard Steel Works Co.
Watson-Stillman Co.
Westinghouse Traction Brake Co.

Planers. (See Machine Tools)

Pliers, Insulated
Electric Service Supplies Co.

Plugs
National Metal Molding Co.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Reinforcing
Hubbard & Co.

Poles, Metal Street
Bates Expanded Steel Truss Co
Electric Railway Equipment Co.
Hubbard & Co.

Pole Sleeves
Drew Elec. & Mfg. Co.

Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
National Tube Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Electric Railway Equipment Co
National Tube Co.

Potheads
Okonite Co., The

Power Saving Devices
Arthur Power-Saving Recorder Co.
Economy Electric Devices Co.
National Railway Appliance Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg Co

Pumps
Schutte & Koerting Co.
Watson-Stillman Co.

Punches, Ticket
Bonney-Vehslage Tool Co.
International Register Co. The
Wood Co., Chas. N.

Punching Machinery
Watson-Stillman Co.

Purifiers, Feed Water
Scaife & Sons Co., Wm B

Rails
Cambria Steel Co.
Foster & Co., L. B
Lackawanna Steel Co
Midvale Steel & Ordnance Co.

Rail Grinders. (See Grinders)

Rail Joint Plates
Lackawanna Steel Co.

Railway Safety Switches
Westinghouse Elec. & Mfg Co

Rail Welding. (See Welding Processes

Rails, Relaying
Foster & Co., L. B.
Zelnicker, Walter A. Supply Co. Inc.

Rails, Steel
Carnegie Co.

Rattan
Brill Co., The J. G.
Electric Service Supplies Co
McGuire-Cummings Mfg Co

Recorders, Power Saving
Arthur Power-Saving Recorder Co.

Registers and Fittings
Brill Co., The J. G
Electric Service Supplies Co.
International Register Co., The
Ohmer Fare Register Co.
Rooke Automatic Register Co

Reinforcement, Concrete
American Steel & Wire Co
Carnegie Steel Co.
Lackawanna Steel Co.

Repair Shop Appliances. (See also Coil Banding and Winding Machines)
Columbia M. W. & M. I Co
Electric Service Supplies Co

Repair Work. (See also Coils)
Cleveland Armature Works
Columbia M. W. & M. I. Co
General Electric Co
Independent Lamp & Wire Co.
Westinghouse Elec. & Mfg Co

Replacers, Car
Columbia M. W. & M. I. Co
Electric Service Supplies Co
Reading Specialties Co.

Resistance, Grid
Columbia M. W. & M. I. Co

Resistance, Wire and Tube
General Electric Co.
Westinghouse Elec. & Mfg Co

Retrievers, Trolley. See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Westinghouse Elec & Mfg. Co

Roofing, Building
Barrett Co., The

Rosettes
National Metal Molding Co.

Rubber Covered Wire & Cables
Belden Mfg. Co.

Rubber Specialties of All Kinds
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Enamel
Magnet Wire

For those who require better insulation than the ordinary cotton and silk covering affords. This new Enamel wire will give the desired results.

When used with cotton and silk covering it gives a much increased insulation value.

When used without cotton or silk covering it takes up much less space and has good insulation value.

Will not crack when bent and will not get brittle when subjected to high temperatures.

Write for details.

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SALAMANDER
Pure Asbestos

During the rush hours when your motors are greatly overloaded and become excessively hot you need not have any fear of burnouts if the coils are insulated with Salamander Pure Asbestos. It will not burn no matter how hot it gets.

Send us your burnout coils and let us rewind them for you. We are in a position to rush work, thereby helping you out of your difficulties.

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YOUR ROADBED

will be smoother and easier riding if tamped with "Imperial" Tie Tampers. Also, it will *stay* that way for a long time—an important item, especially where the ballast is overlaid with paving.

"Imperial" Tie Tampers save labor on this work, and they save labor on other jobs, for you can use them for tearing up any kind of pavement, cobble, asphalt or concrete.

The air furnished by the compressor car may and should be used for bonding rails, tamping concrete, sandblasting, painting, and all the other useful ways that air can be supplied.

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WHAT AND WHERE TO BUY

Sanders, Track
- Brill Co., The J. G.
- Cleveland Armature Wks.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Ohio Brass Co.
- St. Louis Car Co.

Sash Fixtures, Car
- Brill Co., The J. G.

Scrapers, Track. (See Cleaners and Scrapers, Track)

Seats, Car.. (See also Rattan)
- Brill Co., The J. G.
- Peters & Co., G. D.
- St. Louis Car Co.

Second-Hand Equipment
- Archer & Baldwin
- Cleveland Fare Box Co.
- Foster Co., L. B.
- Griswold Machine Co., G. M.
- Hyman Michaels Co.
- Zelnicker Supply Co., Inc., Walter A.

Shades, Vestibule
- Brill Co., The J. G.

Shovels
- Hubbard & Co.

Shovels, Power
- Brill Co., The J. G.
- Thew Automatic Shovel Co.

Signals, Car Starting
- Consolidated Car Heating Co.
- Electric Service Supplies Co.
- National Pneumatic Co., Inc.

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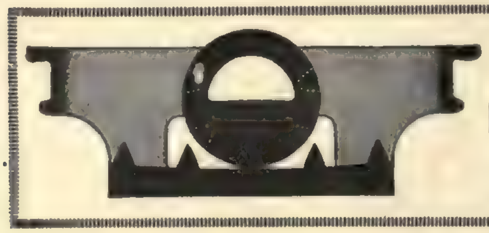

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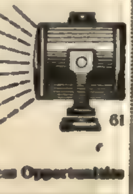

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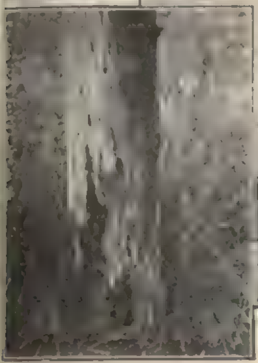
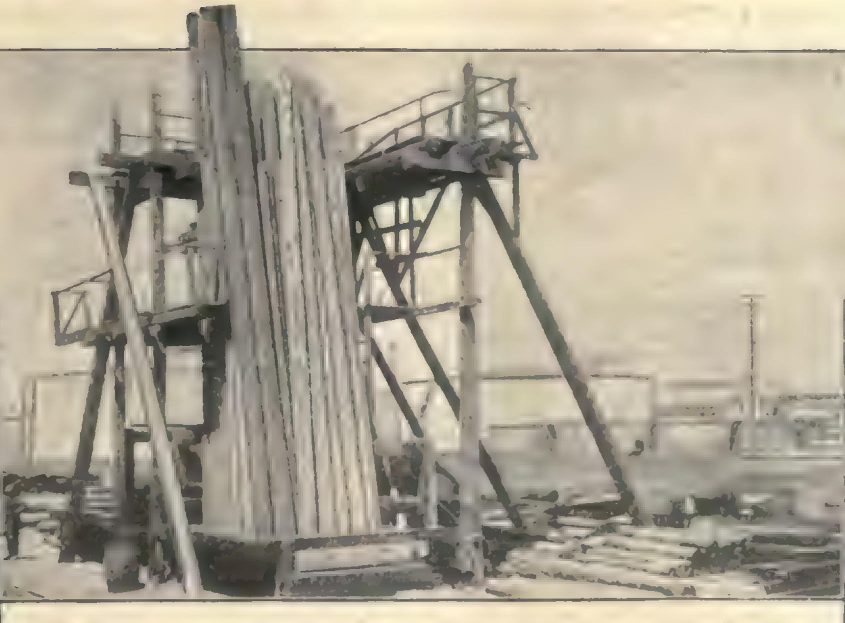


A condition hazardous to the entire line.



Open Tank process carbosoting plant of Southern California Edison Company. Simple, effective, economical tanks with a capacity of 75 to 150 poles each day.

Pole reinforced with creosote stub. (Courtesy U. S. Forest Products Laboratory)

Pole Salvaging and Timber Conservation—

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Plants quite similar to this type are practicable for consumers whose yearly requirements exceed 2,000 poles, and can be installed at surprisingly low cost.

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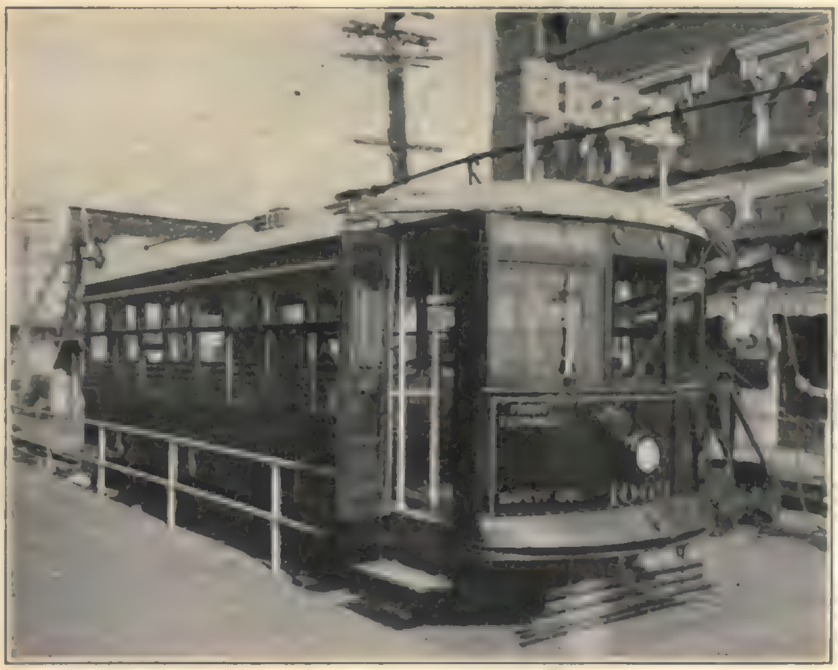

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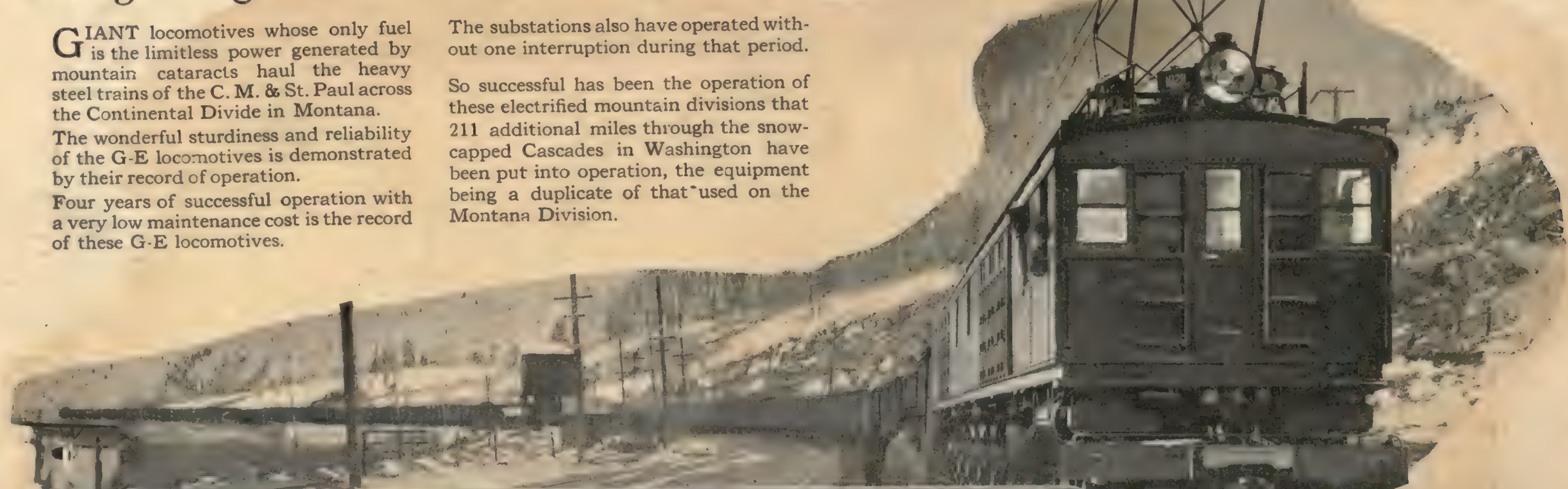

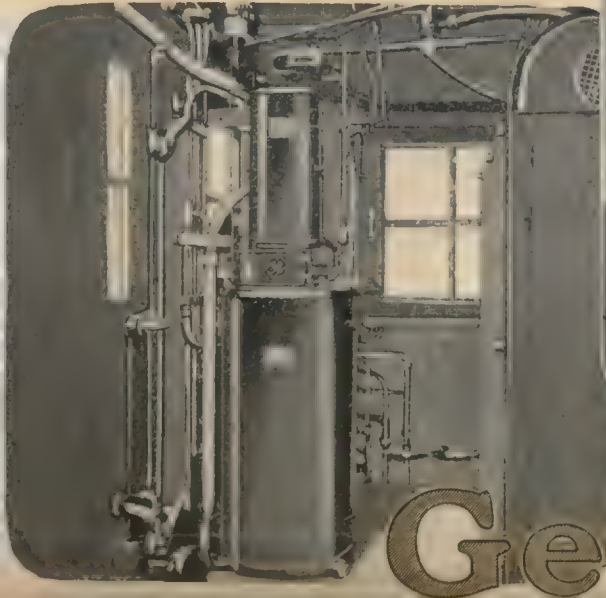

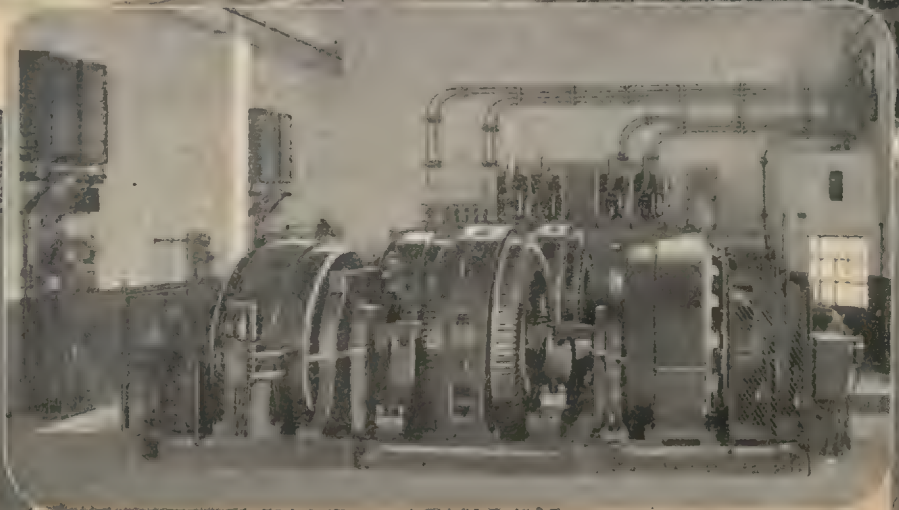

General Electric

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ELECTRIC RAILWAY JOURNAL

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commands high wages. Why waste his time and your money with inferior splicing materials.

Give him Okonite and Manson Tapes and Okonite Cement to use and note the absence of joint failures.

The use of these three insures joints which will be as strong electrically and as long lived as the insulated wire itself.

Write for full particulars.

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Incorporated 1884
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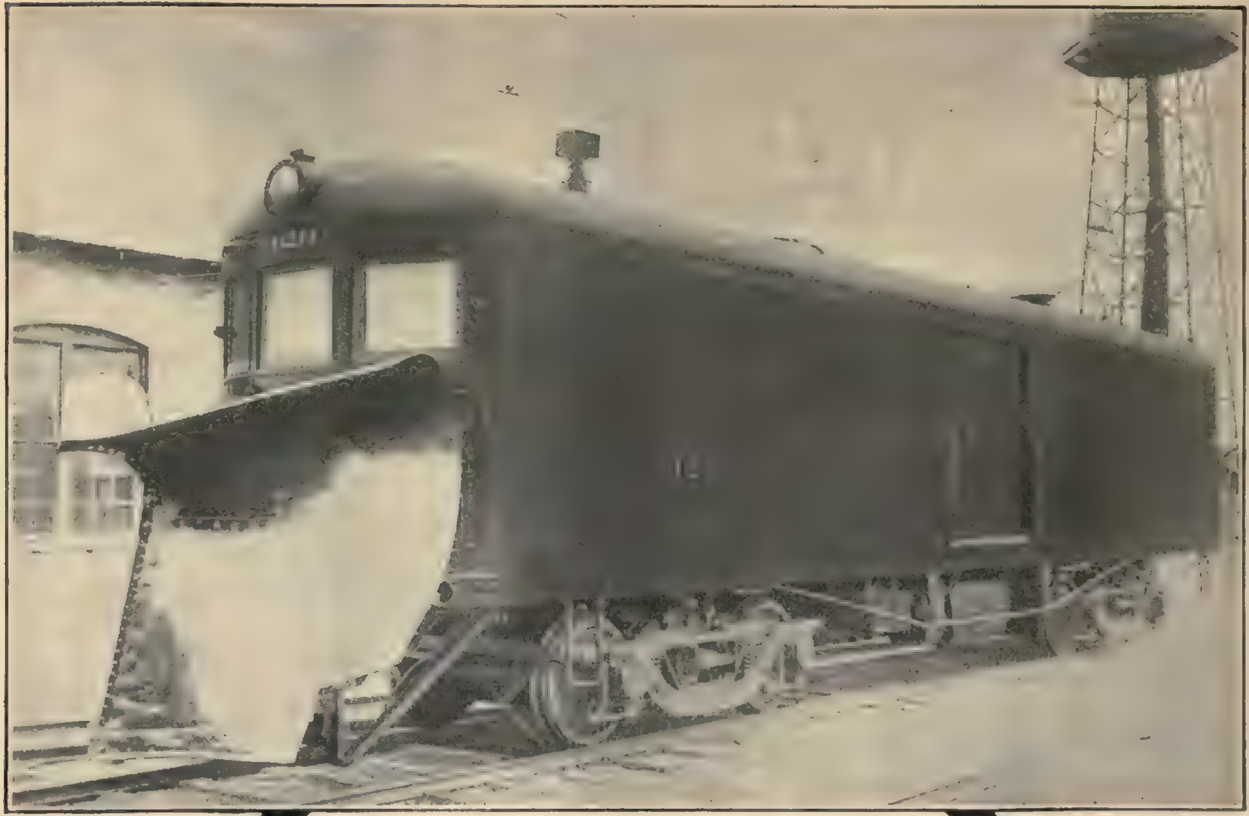

Baggage and Express Cars Make Good Snow Fighters

They should be equipped with this in view.

Freight can be hauled and at the same time they keep roads open during the winter storms. Each one should have its detachable snow plow, truck guard and other snow-fighting equipment.

As to the proper equipment, Westinghouse No. 306 or No. 548 motors and HL Control are recommended, for they have weathered many winters successfully.

Westinghouse Electric and Mfg. Co.
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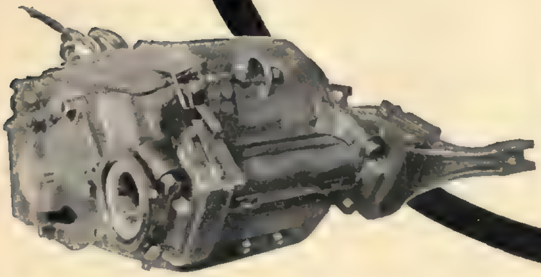

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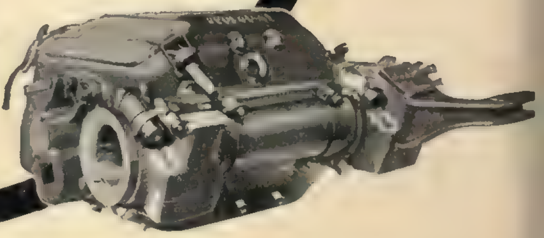
WESTINGHOUSE ELECTRIC



Westinghouse

Vol. 56, No. 20 New York, November 13, 1920 *Pages* 997-1042

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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Advantages of Modern Steam and Electric Locomotives

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Circulation of this issue, 6,325

Advertising Index—Alphabetical, 58; Classified, 52, 54, 56; Searchlight Section, 47-51

In Four Years Safety Device Popularity Has Grown From Sample Orders To Hundreds at a Time

In 1916 Safety Car equipments were being ordered on practically a *sample* basis.

In 1917 and 1918 the smaller companies began to order Safety Cars in fives and tens.

Since 1919 big city and state-wide systems have been ordering safeties by scores and hundreds.

And today the orders for Safety Cars are greater than for all other kinds of electric rolling stock combined.

Note that every one of these Safety Cars is sure to make good because of its control combination.

Hold Fast To This Specification

It Is a Genuine Safety Car Only When

it is equipped with automatic laborless apparatus, so interlocked that, regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the steps folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

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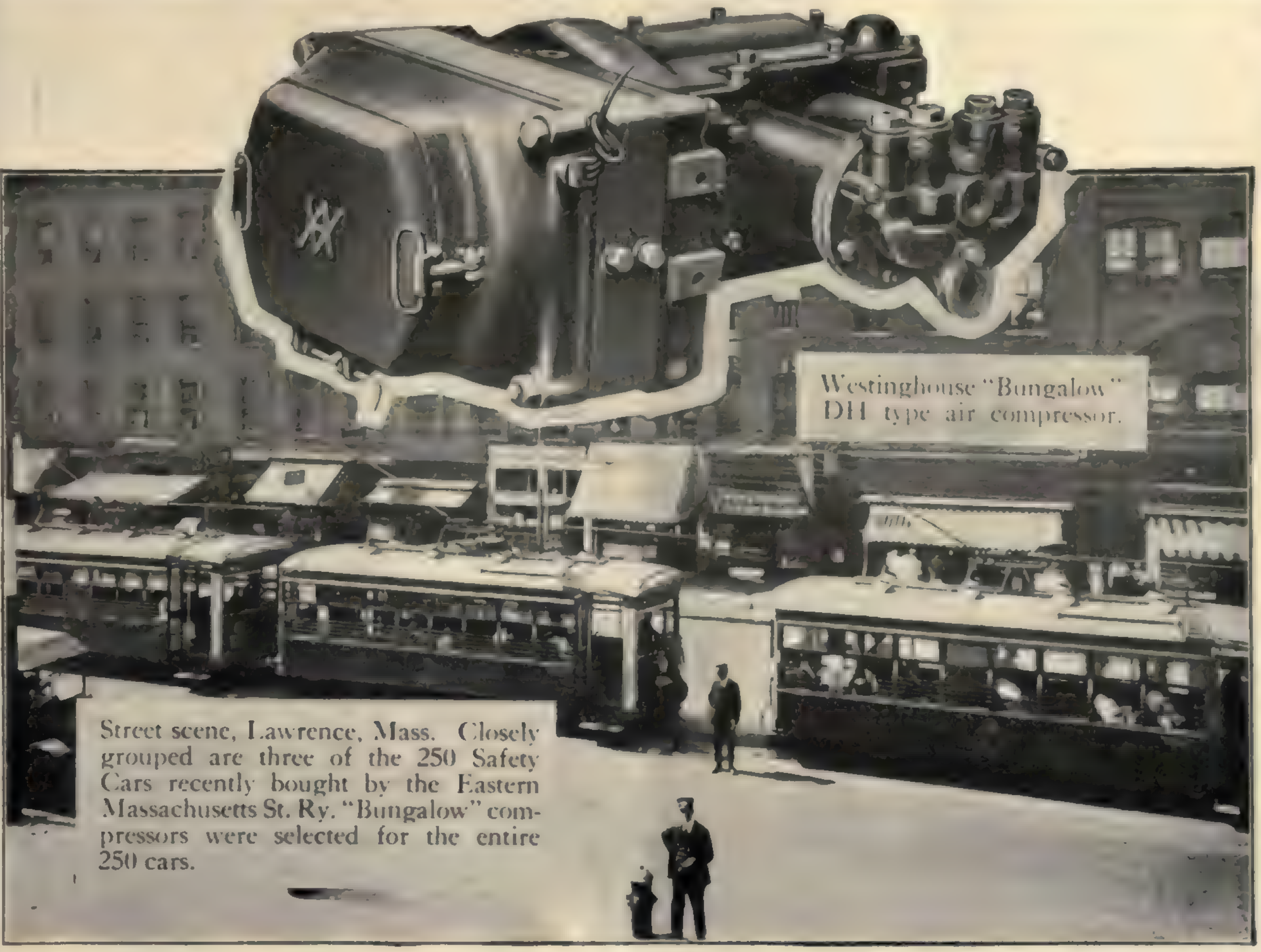

Westinghouse "Bungalow" DH type air compressor.

Street scene, Lawrence, Mass. Closely grouped are three of the 250 Safety Cars recently bought by the Eastern Massachusetts St. Ry. "Bungalow" compressors were selected for the entire 250 cars.

"Bungalow" Air Compressors

—assure an ample supply of compressed air for brakes, door, step and safety interlocking devices of the Safety Car. All the largest orders have specified them—Brooklyn, 200; Eastern Massachusetts, 250; Public Service Corporation of New Jersey, 200.

The "Bungalow" is installed on 3330 Safety Cars operating on 187 electric railways in the United States.

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Phono-Electric

"What a true line," any line engineer will say on examining the overhead work of the Pennsylvania's 11,000-volt Philadelphia-Paoli electrification.

And it will stay true for years to come, despite the almost incessant pounding from the current collectors of high-speed trains, because Phono-Electric trolley wire is a contact wire that is stiff enough to stay in line and hard enough to take the wear.

Bridgeport Brass Company
Bridgeport Connecticut

You Are Paying More for Poor Bonding Than Good Bonding Costs

It looks like money saved to let bonding slide.

Actually it is extravagance.

At every poorly bonded joint, voltage drops and power is consumed.

Your power costs wipe out the money saved on bonding.

Burnt-out armatures—the result of low voltage—keep skilled workmen busy.

Cars starved as to voltage—operate slowly and service suffers.

"The Return Circuit" explains every phase of rail bonding and its effect on operation. It's interesting—and free.

O-B Bonds are Good Bonds

A few typical O-B Bonds are illustrated here. There is one O-B Type just right for your road.

Type AW-3 Bond for Ball of Rail
Also made for Base of Rail

O-B Arc Weld Bonds

Type ST-2 Bond

One of the three types O-B Gas Weld Bonds

Type F-3 Bond
Concealed Type of Bond, installed under splice bar

Type E-2 Bond
A long bond for around the splice bar. Especially valuable on joints where rail movement is considerable

O-B Stud Terminal Bonds made with either compressed or pin expanded terminals.

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Manufactures Trolley Materials, Rail Bonds, Car Equipment, Hi-Tension Insulators, Third Rail Insulators

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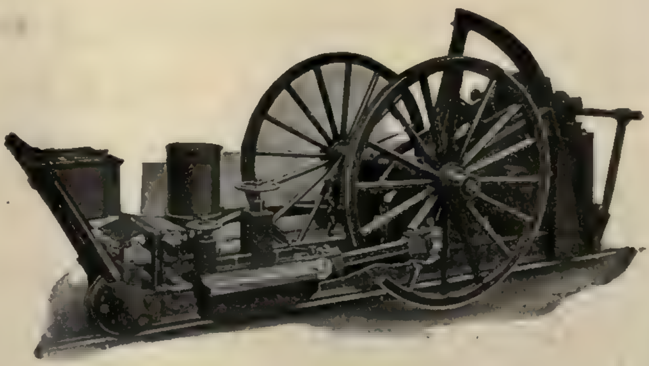
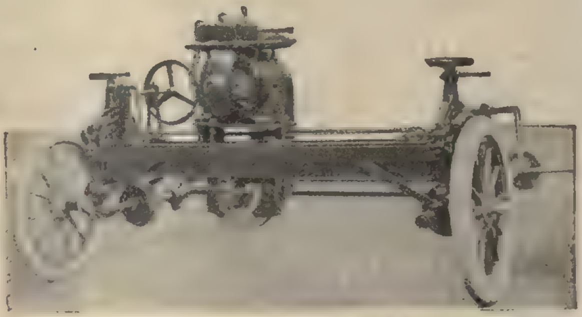
The surplus metal remaining after a weld must be eliminated to obtain a smooth track. The Universal or Atlas Grinders efficiently and easily do this work. The rotating grinding wheel, running at high speed, in guides, produces a smooth, tractive surface quickly and economically.

Tell us your track troubles



Reciprocating Track Grinder



Universal Rotary Track Grinder

Atlas Rail Grinder

RAILWAY TRACK-WORK COMPANY

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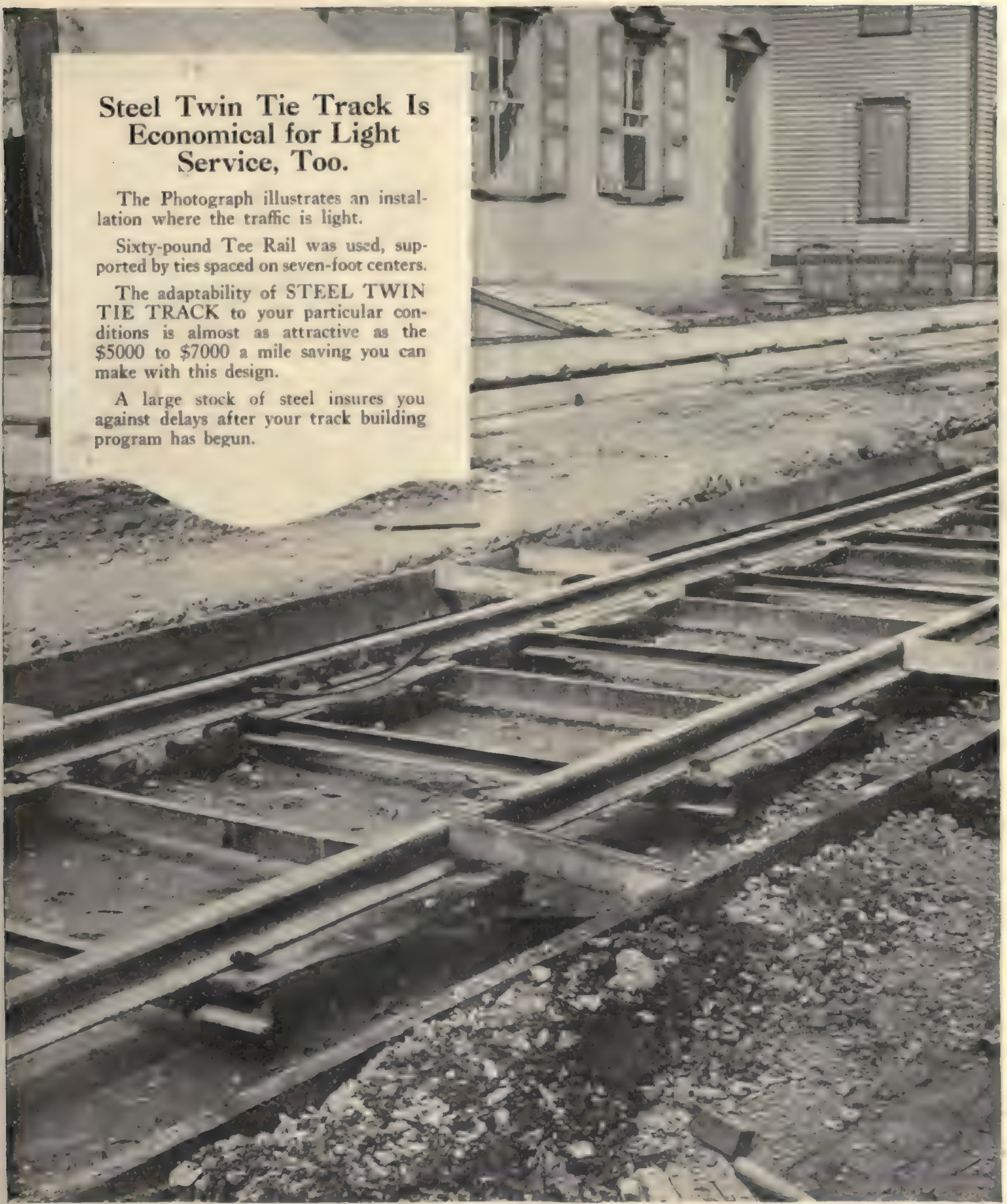

Steel Twin Tie Track Is Economical for Light Service, Too.

The Photograph illustrates an installation where the traffic is light.

Sixty-pound Tee Rail was used, supported by ties spaced on seven-foot centers.

The adaptability of STEEL TWIN TIE TRACK to your particular conditions is almost as attractive as the $5000 to $7000 a mile saving you can make with this design.

A large stock of steel insures you against delays after your track building program has begun.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

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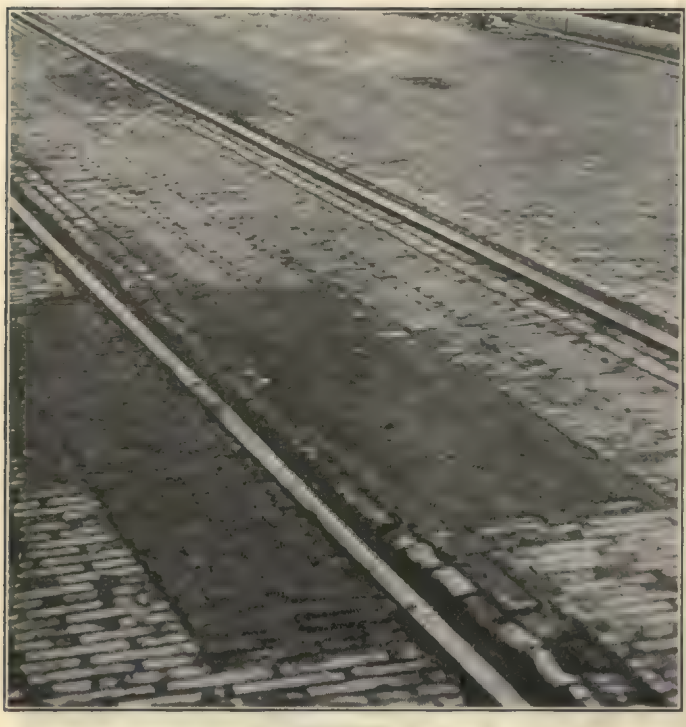

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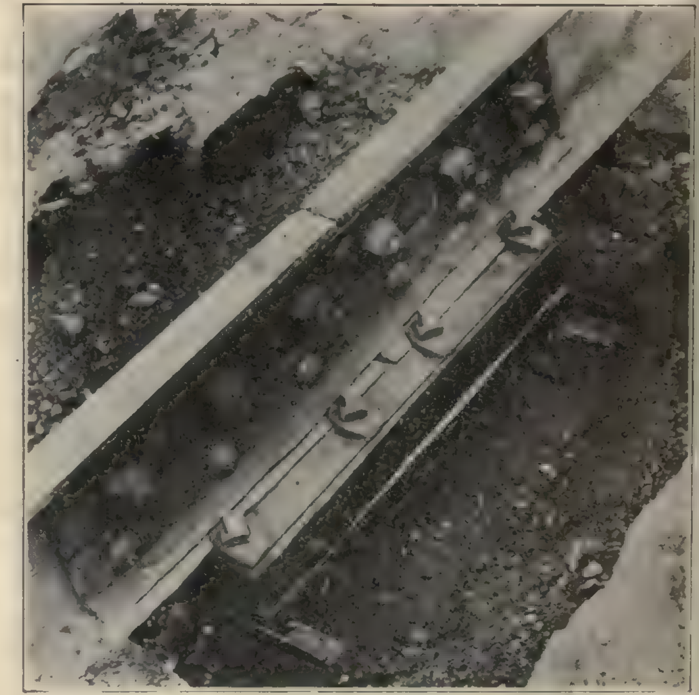
AFTER

$4.50

will buy this permanent cure for bad joints.

That temporary work you are doing now on your bad joints can be made permanent by adding the Dayton Resilient Joint Booster.

Your chief expense in shimming up a bad joint is taking out the old paving and replacing it. Why go to this expense for something only temporary? Add a Booster and make it permanent.



CURE

Installing Dayton Resilient Joint Booster

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

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Keystone Rotary Gongs

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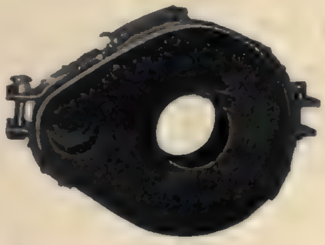
Faraday Car Signal Systems


Keystone Steel Gear Cases

Keystone-Hunter Destination Signs

Always specify them for they will serve you well. Write for Bulletin No. 167, showing many other Keystone specialties for use on safety cars.

Safety Car Lighting Fixtures

"Safety" type fixtures, in combination with Mazda lamps and properly designed reflectors or shades, uniformly distribute the light where needed and show a great saving in current consumption, and at the same time present a much more attractive appearance to the interior of the car, besides the additional eye comfort afforded to the passengers.

This method of car lighting also allows the use of higher candle power lamp units, thus reducing the amount of current per candle power consumed and also reducing the number of lamps required, thereby effecting a very considerable saving in the cost of lamp renewals. In new cars there is also a proportionate reduction in the cost of wiring.

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Manufacturer of Railway Material and Electrical Supplies

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Wire that meets or exceeds the specifications of the American Society for Testing Materials

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For the Hard, Cold Dollars

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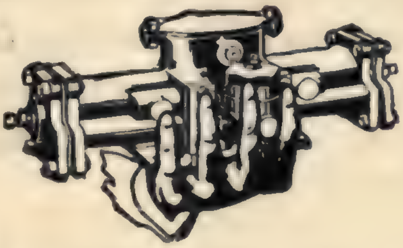
Here's what Alexander Jackson, Supt. of time-tables of the Public Service Railway, told the 1920 Convention:

Saving in investment 76 cars (764 cars doing the work of 840 cars) at $27,500 per car	$2,090,000	
Saving in interest at 8%		$167,200
Saving in platform expense at $1.20 per car-hour—$1284 per day—$1284 x 350 average days		449,400
Saving per annum		$616,600

And that's not saying a word about lower power house, shop and other investment!



A good way to get all of these big savings is by cutting off wasteful seconds with the

NATIONAL PNEUMATIC "Rushour" Line

Door and Step Control
Door and Step Mechanisms
Motorman's Signal Lights
Safety Interlocking Door Control
Multiple Unit Door Control.

National Pneumatic Company, Inc.

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Meeting the Demands of both Riders and Railways

Both the public and Electric Railways are demanding things these days. The public wants better service—faster schedules—safer traveling.

The Railways want to foster public good will by giving this better service and at the same time increase their revenue to meet heavier operating expenses.

Anything that suggests a possible solution of this "double demand" should be investigated. Everything that helps the operating company come a step nearer to the goal should be employed.

For this reason, every progressive Electric Railway should learn more about Johnson Fare Boxes. Records for hundreds of roads now using them *prove* that they do speed up schedules—and make traveling safer, thereby meeting the demands of the rider.

Logically, a better understanding between carrier and rider is created. And most important of all, Johnson Fare Boxes increase gross revenues from 3 to 10%.

Isn't it worth investigating?
Write today for all the facts.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.

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Found The World Over

At the Convention Exhibit—

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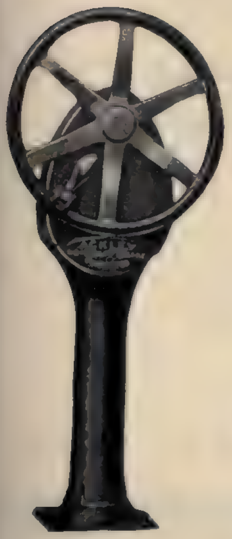
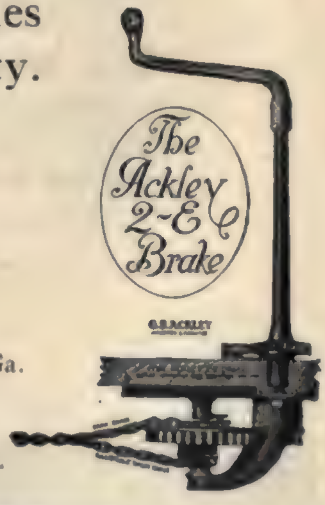
No other brakes have the pioneer Ackley features and no other brakes have their power and operating surety.





For *all* types of cars.

The Ackley No-Staff — Bulletin D
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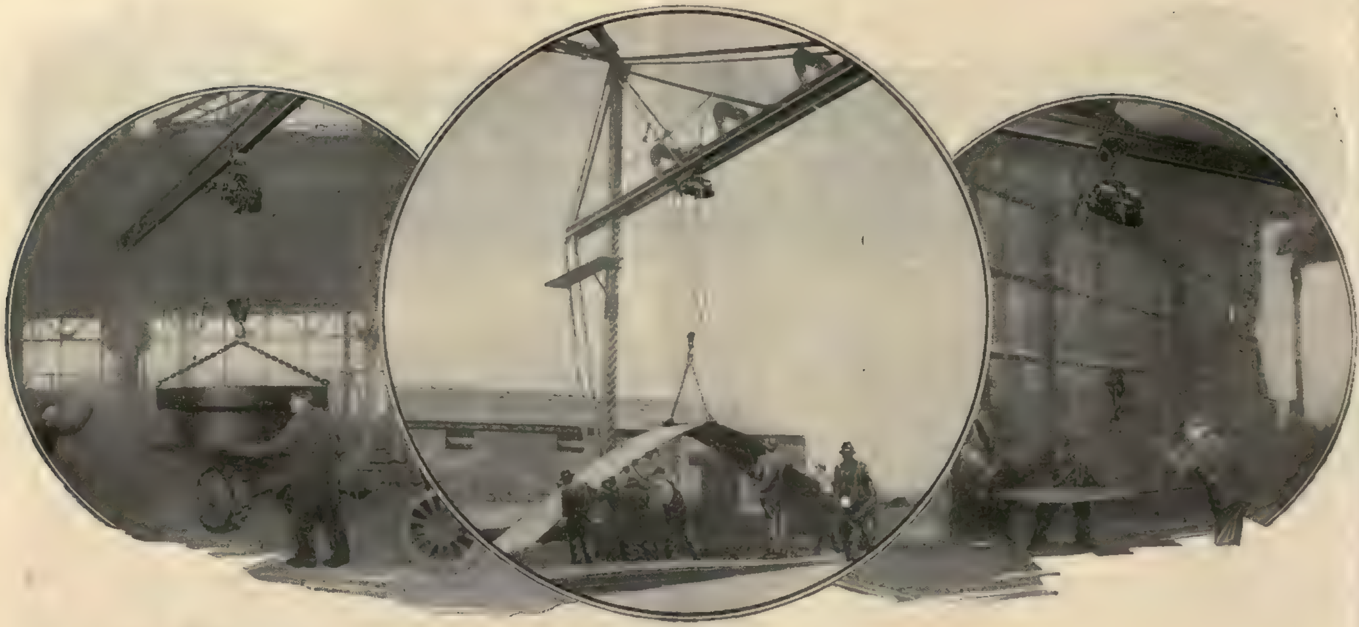

If the Pyramids were built today—

PIECE by piece, with years and men no object, clumsy hand-power slowly built the ancient Pyramids.

But, today, when men and minutes count big, man-power stands little chance in a tug-o'-war with the swift lifting power of Little Giant Pneumatic Geared Hoists.

They lift from one to ten tons without a hitch, jerk or jolt. A Little Giant load never slips because its automatic air-brake always grips. It holds what it hoists. A protecting limit-stop prevents jam-ups from over-hoisting.

Hoist pneumatically! Reduced labor costs and increased production prevail wherever Little Giants are used. These rugged all-steel hoists put *lifting* on a *production* basis.

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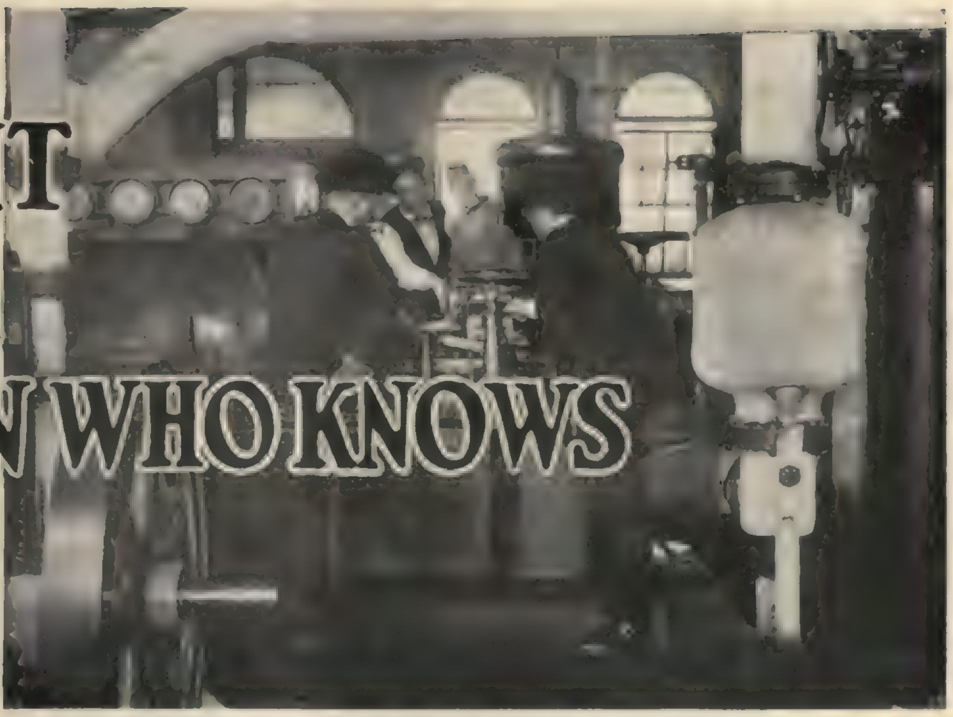


GALENA QUALITY

Railway lubrication is not a *side line* with this company; it is a *specialty*—a business built upon the knowledge and experience of over a half century of test and research.

Galena Quality Oils and Galena Service are daily proving their value on hundreds of the electric railways of America by making possible an operating efficiency that is unattainable without perfect lubrication. The economy of Galena scientific methods is shown by increased mileage, preservation of bearings and equipment, and the elimination of the expensive repairs that are inevitable with faulty lubrication. There is not a single instance of competitive test in which Galena Quality Oils have failed to prove conclusively their ability to give maximum service at minimum cost.

Galena Quality is Our Bond
and Your Security!

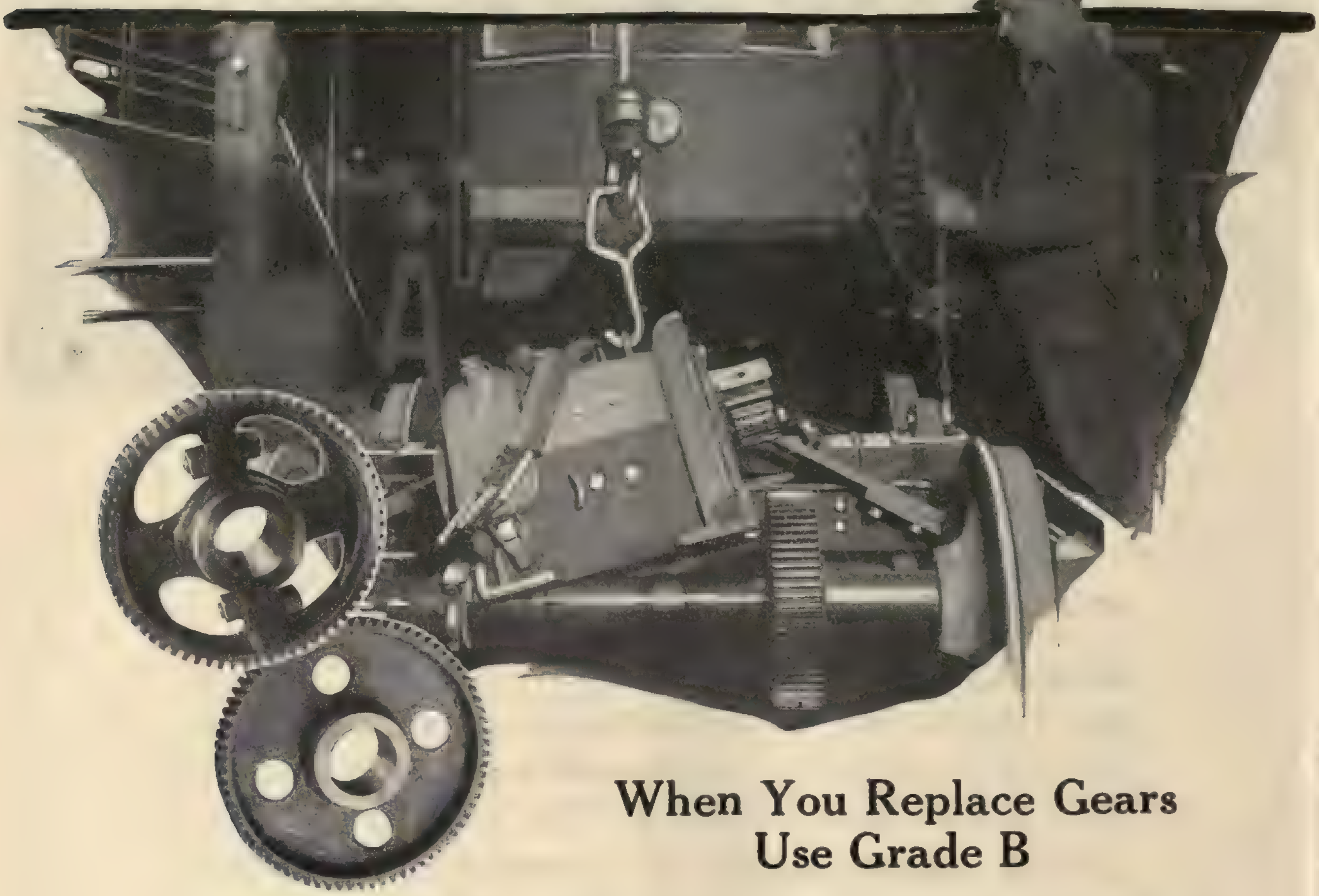
Galena-Signal Oil Company

New York *Franklin, Pa.* *Chicago*

and all principal American cities

LONDON TORONTO BUENOS AIRES MONTREAL PARIS

The best is always most economical in the long run whether in the purchase of original equipment or of replacement parts.



When You Replace Gears Use Grade B

Grade B is a low-cost, long-service gearing. Its manufacturing processes are very similar to those employed in the making of Grade M but a carefully inspected cast steel blank is used in place of the forging used for the latter grade.

Grade B is the only gear that can be used successfully in mesh with a grade M pinion and it will give, on average service, as long wear as the Grade M.

Stock Grade B for replacements

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Sales Offices in
all large cities

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 56 New York, Saturday, November 13, 1920 *Number* 20

Patrons Take Advantage of Convenience of Dime Fare

ON a rate of 10 cents cash, with four tickets for 35 cents, on the Chicago Elevated Railways, more than 32 per cent of the passengers paid cash the first month, while on the former rate of 8 cents cash and two tickets for 15 cents only 25 per cent of the riders paid cash. On the new higher rate the saving per ride to the passengers by buying tickets is 1¼ cents, while it was ½ cent on the former rate. In other words, 621,765 more passengers paid a dime cash fare in August than paid an 8-cent cash fare in July, although 1,999,068 more passengers were carried in July than in August. Or, stated another way, 32 per cent of the passengers failed to avail themselves of a saving of 1¼ cents, while only 25 per cent failed to take advantage of a saving of ½ cent.

This seems to emphasize the value and convenience of the unit coin fare. People in large numbers have laid down a dime and walked through the gate rather than be bothered with change-making and the consequent delay for the sake of the cheaper ticket rate. It would also seem to show that when the fare gets up to 8 cents or 9 cents it might as well be 10 cents so far as there is any aversion on the part of the public to paying it, and apparently it might better be 10 cents from the standpoint of the public convenience.

Analyze Your Freight Possibilities Carefully

THAT the transportation facilities of the country have not kept pace with the growth of traffic is common knowledge among business men. This to a certain extent is a direct result of the World War, and in the case of the steam roads government operation is undoubtedly partly to blame. In the case of the electric lines this condition is partly a result of short-sighted regulation which has imposed such restrictions and burdens upon the properties as to prevent a sufficient revenue. This has very naturally caused a stagnation of development and extension and has resulted even in inadequate maintenance of existing property and equipment.

One very important reason for the lack of development of electric railway freight handling may, however, be found in the management itself. Those who have not studied the subject carefully allow themselves to believe that insurmountable obstacles lie in the path of such development. As a matter of fact the obstacles are not there in most cases, as proper investigation will generally prove. In all probability the business is available, and the greatest obstacle to the development of this business is the matter of obtaining the money to purchase sufficient equipment to handle it properly. This obstacle is not insurmountable by any means. If a thorough investigation and analysis indicate that an investment in the necessary rolling stock and station facilities will pay a handsome dividend, surely there are those from whom such funds can be obtained.

We hope that the paper by Mr. Budd and the report of the committee on express and freight traffic presented at the Atlantic City convention will stimulate other companies to develop what Mr. Budd calls a "merchandise" business. The whole country is crying for the service, and surely no time is more propitious than the present moment, for the rates on the steam lines have now been largely advanced, thus giving the electric lines a greater margin for increase in rates for a service which warrants such an increase.

San Diego's Encouraging Experience with the Zone Fare

AMERICAN electric railway operators throughout the land will be gratified, we believe, to read in this issue of the success which the San Diego Electric Railway has attained with the zone fare since its inauguration on the first day of this year. The feeling has been growing that the zone fare, by which is meant some form of measured service, has much to support it as the logical fare, at least as an economically just fare, and one which, commercially considered, has the advantage of attracting and serving the short-haul riders. But it is not to be denied that the disheartening experiences of the Public Service Railway and the Connecticut Company have put a damper on the enthusiasm of many operators. Permanent discouragement, however, would not be justified without further trial in view of the fact that there must be some very advantageous features or the zone fare railways in this and other countries would change to the flat fare.

San Diego, fortunately, was able to begin under happier auspices than either of the companies just mentioned. The California Railroad Commission recognized that its chief function was to determine whether the railway needed relief and not to tell the railway exactly how it should try to get relief. Once the company had established its case, the commission did not hesitate long in approving the plan worked out and submitted by the railway management. That plan, fundamentally, was to secure the needed revenue without losing any profitable short-haul traffic, and yet, at the same time, to make the increase to the long-haul rider as little as practicable. San Diego's sound reasoning was that if the short-haul rider could be retained the tax on the other riders would be less than if every one of a smaller number of riders was expected to pay a higher unit fare. The event has justified all hopes, for how many other companies can show a 40 per cent increase in revenue and 12 per cent increase in traffic despite diminished local activities?

If we look closely into the reasons for San Diego's splendid start we may set them down as follows:

First, public understanding and co-operation, for there was no doubt in the minds of either the public or the commission that the company had been rendering a great service without adequate return. Second, patient and resourceful publicity in a campaign where the officials of the company did not hesitate to explain the needs of the company face to face with every element in the city, from the scared real estate men to the worker in store and factory. Third, straightforward co-operation with the transportation personnel, including a bonus plan that has made the selling of rides and the collection and auditing of fares a matter of abiding interest to conductors and motormen. The success of the bonus plan, let it be added, must have been promoted in large measure by the fact that the management had already proved liberal with its men in sharing the savings from accidents and other items subject to economy. Fourth, a system of fare charging and fare procedure that indicates a feeling of civic responsibility, of fairness to those who have to ride and of willingness to learn from the experience of other zone-fare operators. It is truly amazing that fate should have reserved to so diffused a city as San Diego the chance to demonstrate successfully that there are means of getting more revenue other than the expedient of an ever-rising unit fare.

The Pendulum Is Always Swinging

A CONDUCTOR joshed a plumber riding on his car about being late for work. The plumber came back with the reply, "What do I care, they've got to have us and there's no one to take our places."

If you inquire of the carpenters, plumbers, masons, machinists, painters, plasterers, etc., you will find that apprentices are almost unknown these days. Immigration has almost stopped, and for the past ten years the native American boy has been after the "white collar" jobs.

What has been the result? Today the tradesman commands wages in excess of many "white collar" men; today there is a dearth of skilled workers and a deluge of clerks. Production has gone down and overhead has gone up.

What is now going on?

The pendulum is swinging again toward the economic balance. The trades offer an increasing economic inducement to the worker, while the "white collar" job offers an economic handicap. The law of supply and demand operates slowly but surely. Let us hope that each swing of the pendulum will increase the economic and social worth of civilization.

Adroitness a Factor in Good Advertising

MUCH advertising matter that is foisted on the reading public is dull and heavy because it lacks a certain quality which may, for want of a better term, be called adroitness. An example of what is meant by this is furnished by a recent car card which calls attention to a well known shaving soap in these words: "If ———'s cost you a dollar a tube, a shave would cost you less than one cent." Such a phrase not only induces mental arithmetic but it sticks in the memory.

The same idea is applicable in regard to electric railway fares, and it has of course been used many times. For example we can say: "If your carfare is raised one cent, or 20 per cent, the increase will cost you less than one 15-cent 'movie' ticket a week." Or: "You can ride on this line for half a cent a mile? Do you wonder that we are asking for an increase?" The purpose of such phrases, which need be only suggestive, is to get the reader to make comparisons and thus gain a better appreciation of the thing or service advertised. The trick consists largely in changing the system of units in which the thing or service is evaluated. To illustrate further, it is obviously much better to say that "this incandescent lamp can be burned forty hours for a cent," rather than to explain that its power consumption is 25 watts. It's worth a considerable brain effort to put facts in such homely terms.

Politics Now Has Full Sway in Illinois

ABOLITION of the Illinois Public Utilities Commission and restoration of "home rule," the promise of a law making possible "people's ownership and operation" of the utilities and 5-cent carfares are the reactionary mainstays of the platform on which the political campaign just closed was waged in Illinois. While we seriously doubt that it was these issues which won for the Mayor Thompson-of-Chicago state, county and city tickets, and rather feel it was the Republican landslide that turned the trick, yet the reality must be faced that these candidates won. It certainly is significant, however, that 400,000 people who voted for Harding rebelled against the anti-utility campaign of the Thompson ticket and scratched their ballots to vote against Len Small, Republican Governor-elect. With a Governor pledged as above, what may be expected in Illinois during the next year or two?

Of course it is one thing to say that the utilities commission shall be abolished and quite another to secure the repeal of the act creating it. Also, it is one thing to pass a law permitting municipal ownership and quite another to have m.o. But undoubtedly these things will be put up to the next session of the State Legislature, and if they fail of passage, then the Thompson machine will have a fine excuse to go before the people in succeeding campaigns and declare wherein responsibility lies for the failure of past pledges and to ask for a Thompson Legislature. It wins votes. Mayor Thompson knows as well as we do, or should, that a 5-cent carfare in Chicago is impossible unless the losses are made up by taxation, but the idea of restoring nickel carfare, has a wide appeal, and the local companies have done little in the way of educational publicity to counteract it.

It is not likely that the pledges made involving legislative action can be carried out. But there is still a serious possibility applying particularly to the urban railways of Chicago. The members of the utilities commission are appointed by the Governor. The present commissioners have been actuated in their orders by the highest motives and have had the strength to increase fares against the provisions of existing contracts between the city and the surface railways and against the unthinking popular will made keenly reproachful by the agitation of the city hall. It is obvious, then, that it would be quite in keeping with the campaign methods for the new Governor to appoint men to the commission, as the terms of the present members expire, who will be actuated by the primary motive of popular appeal, with what disaster to the utilities it is hard to say. Grave as this move would be, it is the least the new Governor can do in carrying out his platform, for it entirely within his present powers. This is assumng what is hard to believe, namely, that he will seriusly try to carry out his anti-utility pledges, for that ould be contrary to the best interests of the public, and e must know it.

or Contrast, See New York

N CONTRAST to the situation in Illinois outlined above, it is a pleasure to note the election to the overnorship in New York of ex-Judge Nathan L. Iiller, who ran on a platform one of whose principal lanks was a pledge to work out a constructive policy oward public utilities. Particular mention was given n the platform and in Judge Miller's speeches to the eriousness of the traction situation where, it was ated, a solution was necessary for the good of the pubc. Heaven knows that this is so. Mayor Hylan in ew York rides the 5-cent fare hobby at least as constently as Mayor Thompson of Chicago.

As to how the new Governor will proceed, no one now nows. He has announced that he favors a sufficient ntralization of authority that there may result ecific responsibility which can be located. From this ere should proceed a constructive and not a destrucve program. The only interpretation which appartly can be placed on this is that, among other things, e hands of the public service commissions will be rengthened enough to allow them to perform their gitimate duties. This we hope will be the case. It is rther to be hoped that Judge Miller will keep the ew York solution as free from politics as Illinois ems to be full of politics and that he will, as he pears to promise, base his constructive program on hat the Federal Electric Railways Commission was eased to call "the principles of ordinary economic and siness common sense."

his Broker Should Wake Up

WE RECENTLY noticed the following advertisement over the name of a New York brokere house:

> *The Term Public Utility*
>
> o often confuses the investor who does not take time to scriminate. The many electrical power properties whose nancial structures are sound and whose earnings show od increases from year to year should not be discrimited against because of the peculiar situation surrounding reet railways. May we send you data and statistics on veral electric issues which we believe are particularly tractive at this time.

The advertisement tells its own story. There is no ubt that for a number of years there has been a eling, and justly, by investors against electric railys as an investment. These properties have been ld down to an unprofitable fare while industrial corrations have increased their prices at will. We lieve now, however, that conditions have changed. e right of the utility to a reasonable return is being cognized generally, and the idea that the fare must main fixed, irrespective of the cost of operation, is w discredited. We anticipate that it will not be long fore electric railways will again be accepted as prenting the soundest opportunities for investment, as ey supply a necessity. People have to ride, and bad nes have been found to affect the business done by the reet railways less than almost any other trade.

The broker is behind the times. He should wake up.

Let's Get at All of the Facts Regarding Electrification

IN DISCUSSING the electrification of steam railroads we are looking to the future. It is true that the length of track electrified to date is a small part of the whole, and also that the war caused a cessation of activity. It is true also that in the past the proponents have not been able to agree on the best system for adoption. It is true again that the steam locomotive has been improved greatly in recent years. But in spite of all this we cannot escape the conviction that electric power possesses certain inherent characteristics which will make it more attractive economically as the years go by; in other words, that time favors its wider adoption, in transportation as elsewhere.

In the meantime the underlying facts must be brought out and agreed upon and a spirit of co-operation among railroad men, consulting engineers and manufacturers must be fostered. Meetings of such a nature as that held by mechanical and electrical engineers in New York on Oct. 22 are a factor in such fostering. We have given a great deal of space to the report of this meeting because it reflected thought and experience on electrification from so many angles. In this week's issue appears the contribution by A. W. Gibbs, who occupies a position which gives his opinion unusual weight. The Pennsylvania Railroad, of which he is chief mechanical engineer, has been one of the most consistent, though conservative, advocates of judicious electrification. It has had experience, directly and indirectly, with several types of equipment. Its 600-volt direct-current locomotives at the New York terminal have made an honorable record. At Philadelphia the single-phase system with multiple-unit cars has done well, also. The Long Island and West Jersey & Seashore Railroads were pioneers in heavy direct-current multiple-unit operation. The Norfolk & Western, in which the Pennsylvania is heavily interested, was, of course, the pioneer in the application of the single-phase, three-phase locomotive, with which the Pennsylvania itself is experimenting on its main line with a view to adoption on the division operating over the Alleghany Mountains. This forms the background for Mr. Gibbs' comments on the papers presented by the respective advocates of steam and electric propulsion at the aforesaid meeting.

The New York meeting has been criticized because it was alleged not to have reached any conclusions and because the speakers did not make the most of their opportunity to crystallize the information which they supplied. While this criticism may be justified in part, we believe that the meeting served an important purpose in bringing out facts regarding both steam and electric locomotive operation. It will, however, be a more encouraging sign when steam railroad men, particularly those who are connected with the engineering departments, exert greater initiative in bringing out such facts. At present there is too much antagonism between the mechanical and the electrical divisions of the engineering group. Railroad managers really seem to be more interested in electrification prospects than railroad engineers. The engineers need to get closer together; the best way for them to do this is to keep on discussing the subject at engineering meetings. It will be the duty of the technical press to digest the proceedings of these meetings, without bias, and to interpret them with reference to the over-all advancement of economical transportation.

New York Utility Commission at Work

The First District Commission of New York Approves Issue of $26,000,000 of Securities During 1919 and Regulates Public Utilities Capitalized at Nearly $2,000,000,000

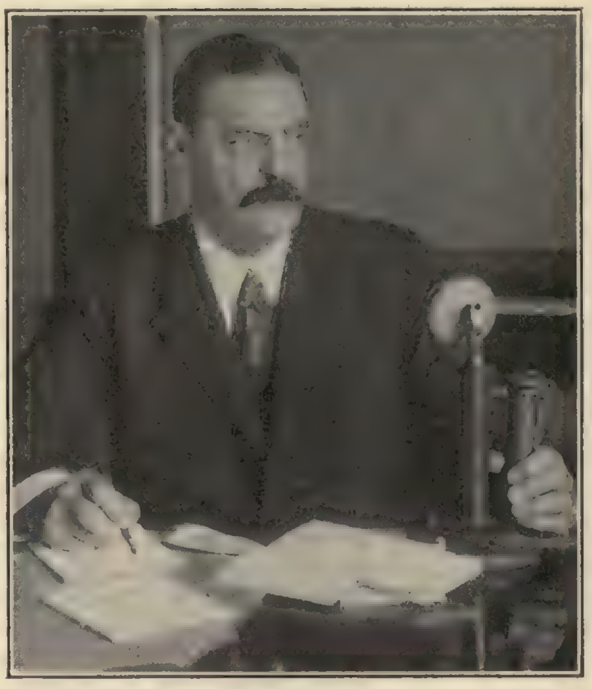
THE regulation of more than a hundred large utilities, capitalized at $1,716,162,100 in the year 1919, in Greater New York is no small task. Their capitalization has very nearly doubled since July 1, 1907, when the First District Public Service Commission was organized in accordance with an act of the New York Legislature. Seventy-five per cent of this present capital represents the securities of common carriers, the ratio being relatively high because of the fact that telephone and telegraph corporations, even in Greater New York, are regulated by the Second District Commission.

The organization of the commissions of New York State is unique. The acts placing the railroads of the state under commission control date back as far as 1851 and 1875. In 1891, however, the so-called "rapid transit act" was enacted by the Legislature. This act, as its name implies, established a special commission having jurisdiction over the plans, contracts, construction and operation of the rapid transit lines, and particularly the new subways. It was far removed from the public utility laws as they are now generally known. In fact, it was an amendment to the steam railroad acts of 1851 and 1875.

In the year 1907 the Legislature passed the "public service commission law," which, with slight amendment, was in effect until 1919. This law established two commissions, one for the "First District," consisting of Greater New York, and the other for the "Second District," which had jurisdiction over the remainder of the state utilities and the telephone and telegraph corporations within Greater New York.

The organization and activities of the Second District Commission were described in detail in the ELECTRIC RAILWAY JOURNAL, Dec. 30, 1916, page 1330, and Feb. 3, 1917, page 196.

Under the public service commissions law of 1907, the Public Service Commission of the First District not only regulated the public service corporations within its district but it planned and supervised the construction and operation of the rapid transit railroads. In accordance with the so-called "Foley laws" of 1919, however, the work of the commission was divided. The Public Service Commission of the First District now performs the customary commission duties within its territory, while a Transit Construction Commissioner, quite independent of the commission of both districts, is appointed by the Governor to take over the rapid transit construction work. This change involved considerable confusion at first, as many subordinate clerks and the records, files, etc., formerly more or less common to the two lines of activity, were segregated with difficulty. The year 1919 was therefore one of transition. On May 26, 1919 Hon. John H. Delaney of Brooklyn was appointed by Governor Smith to the position of Transit Construction Commissioner, at a salary of $15,000 per annum.



LEWIS NIXON
Retiring Commissioner

The First District Commission is now a one-man organization, Hon. Lewis Nixon having been appointed by the Governor to the office of Commissioner at a salary of $15,000 per annum for a term of five years. He assumed office May 3, 1919, the new plan going into effect July, 1919. In accordance with the new law Commissioner Nixon appointed the following Deputy Commissioners: Hon. Alfred M Barrett, Borough of Queens appointed June 19, 1919; Hon Morgan T. Donnelly, Borough of Brooklyn, appointed Dec 30, 1919; Hon. Charles V Halley, Jr., Borough of Bronx appointed April 26, 1920. Th salary of a Deputy Commissioner is $7,500. Provision i made for a secretary for the Commissioner at a salar of $4,200 and one for each Deputy Commissioner at salary of $3,000. The secretary of the commission James B. Walker, under whose direction are found number of bureaus, fills a position of large responsibility. The counsel, in charge of the legal department is Terrance Farley.

FUNCTIONS OF COMMISSION

Originally the commission had placed upon it b legislative enactment the usual regulatory duties i connection with issuance of securities, establishmen of rates, checking of service conditions, accidents, etc of railroads, both steam and electric; light, power and gas corporations, etc. A later amendment place the baggage, terminal railroad, stage coach and bu lines, electric conduit and steam distributing corporations under the authority of the commission. In spit of this fact the municipal government of New Yor City continuously and consistently resisted commission control of bus line activities. This feature o utility regulation is of particular interest at presen for the jurisdiction of commissions over such lines subject to investigation and controversy throughout th country.

Another unique feature of the early New York a rovided that of the expenses of the commission only he salaries of the commissioners, counsel and secreary, amounting to approximately $91,000 for the First)istrict, should be borne by the State. The remainder vas to have been paid by the city of New York. The egislative enactments of 1916, however, provided that xpenses incurred in regulatory work should be paid n the future by the State, the remainder by the city. 'hus, in 1917 the State paid the largest amount ($252,-89) ever expended up to that time as its share of the ommission expense for this district. The share of the ity was, during this year, more than $3,000,000. It hould be remembered, however, that much of this expense in connection with the ew subway construction, paid under the rapid transit act, vas charged to the rapid transit lines and will eventually be paid back to the city hrough earnings set aside in an amortization fund.

During the first decade rom 1907 to 1917 this commission, in its regular routine f activities, held 2,200 formal earings, settled 15,000 complaints and supervised the issue of securities to the extent f $700,000,000. Electric meers have been tested, upon omplaint only, to the extent f 6,000, while a rather more xacting policy with regard to as meter testing has involved nore than 4,000,000 laboraory calibrations.

ALFRED M. BARRETT
Just Appointed Commissioner

As far as the supervision f rapid transit construction vas concerned, the greatest mount of work accomplished vas in the year 1916, although he commission employees, numbering 11,000 in that ear, represented about one-half the force necessary n 1914 to 1915.

The widely varying work of the commission is caried on by seven departments and bureaus, designated s follows:

1. Statistics and Accounts—Dr. A. F. Webber, chief tatistician.
2. Equipment and Electrical Engineering—R. H. Iexsen, electrical engineer.
3. Gas—William Merrifield, chief gas engineer.
4. Grade Crossings—W. L. Selmar, assistant division ngineer.
5. Transit Bureau—Alexander Bassett, assistant hief inspector of stations.
6. Secretary's Department.
7. Legal—Terrance Farley.

The organization chart, reproduced herewith, gives good idea of the relations of the various departments nd the number of employees required by each.

DEPARTMENT OF STATISTICS AND ACCOUNTS

The analysis, tabulation and publication of capalization, operating costs and other statistical data eported by the utilities of the district are undertaken y this department. This work naturally divides itself nto four classes:

1. Preparation of charted data and statistics for public consumption.
2. Investigations and reports to the commission in connection with hearings.
3. Study by accountants of books of utilities to determine financial status for decisions of the commission upon the issues of securities.
4. Replies to inquiries from outside regarding specific cases.

Aside from the voluminous record of operating statistics of the utilities published in the annual report of the commission, there is prepared by this department a series of quarterly pamphlet reports of each of the street railway companies of the city. These reports, which may be had for the asking by any one interested in railway operating conditions, set forth the following information for the quarter immediately preceding the date of issue of the report:

1. Operating revenue, subdivided by roads; transfer and fare passengers: increase over previous quarter, etc.
2. Revenue car-miles.
3. Operating expenses and taxes; total and detailed items, including maintenance, depreciation reserves, injuries, general expense, etc.
4. Gross and net income.
5. Balance sheet.
6. Traffic statistics, including miles of track, passenger cars operated, car-hours, car-miles, seat-miles, revenue car-miles, etc.
7. Operating revenue for twelve months.
8. Operating expenses and taxes for twelve months.
9. Gross and net income for twelve months.

"Monthly Broadsides," similar to that reproduced herewith, indicating traffic and financial conditions, month by month, are found to be in great favor by banks, bond houses, real estate agents and the daily press.

PROBLEM OF PREPARING DETAILED STATISTICS IS A DIFFICULT ONE

The problem of preparing such detailed statistics for the thirty-six operating and twenty-three lessor railway companies of New York is a difficult one. In no other city is the railway industry so subdivided and interconnected. The monthly report, for example, combines fifteen subordinate companies' reports of the Third Avenue Railway alone into a single record.

The accountants of this department do not check up regularly the accounts of the utilities as is done in some states, but make special investigations of their books pending rate or security hearings. In order to establish, for example, the correct status of proposed and early bond issues in one recent case which attracted considerable attention, *i.e.*, the New York & Richmond Gas case, it was necessary to trace accounts back through the books of the parent organizations to the year 1860.

JAMES B. WALKER
Secretary of First District Commission

A great deal of pioneer work was necessarily done in connection with utility accounting by this department. With the exception of Massachusetts, no state had undertaken such investigations at the time this work was begun in New York. It is still difficult to arrive at a satisfactory and equitable basis for security issues for utilities in terms of either "book values" or "appraised values," but much has been accomplished by making the best decision practicable, submitting it to the acid test of litigation and profiting by the resulting court decision to establish mileposts for future work.

With the salary limitations under which this work must be carried on, together with the civil service examination policy which applies to such positions, it is not possible at present to do as much as in some other states in proportion to the magnitude of the utilities involved. Boys starting in the office at $50 per month are advanced, by promotion examinations, to statistical clerks at $90 a month. Clerks' salaries vary from $60 to $90 and stenographers from $75 to $125 a month, The accountants range from the junior grade at an annual salary of $1,380 to the more responsible positions paying $4,000 per annum. Statisticians are paid by this department from $1,380 for the junior grade to $5,000 for the chief of division of accountants or assistant chief statistician. The payroll for the accountants and statisticians, excluding clerks and stenographers, for this department is to be $79,701 for the year 1920, in effect July 1.

DEPARTMENT OF EQUIPMENT AND ELECTRICAL ENGINEERING

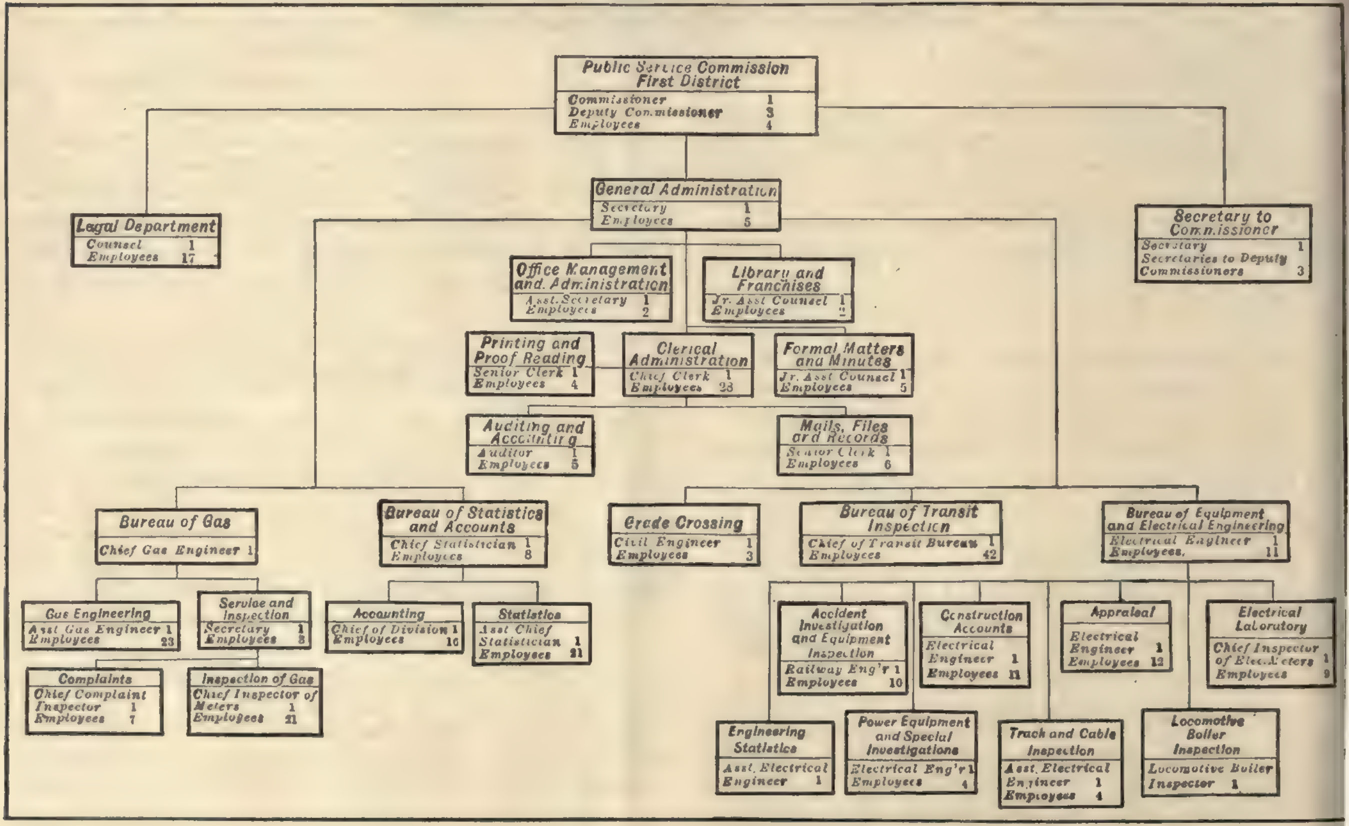
This department, under the direction of the electrical engineer of the commission, R. H. Nexsen, is really the technical or engineering section of the organization. The work is classified into eight divisions:

1. Electrical testing laboratory.
2. Appraisal.
3. Accident investigation and equipment inspection.
4. Construction accounts.
5. Engineering statistics.
6. Power equipment and special investigations.
7. Track and cable inspection.
8. Locomotive boiler inspection.

Electrical Testing Laboratory.—An electrical testing and calibrating laboratory was installed by the commission in 1908 for the purpose of calibrating consumers' watt-hour meters upon complaint and the primary standards of the utilities. At first the standards of the commission were checked by outside testing laboratories, but in 1910 precision instruments, checked regularly by the United States Bureau of Standards at Washington, were adopted.

One interesting feature of the work of this laboratory, in co-operation with the National Board of Fire Underwriters, is the testing and approval of all new types of watt-hour meters, auxiliary devices used in connection therewith, transformers, switches, electrical fittings, etc., before such can be placed in use by the utility. Between 5,000 and 6,000 such devices have already been tested and approved for use.

In connection with these tests and inspections of

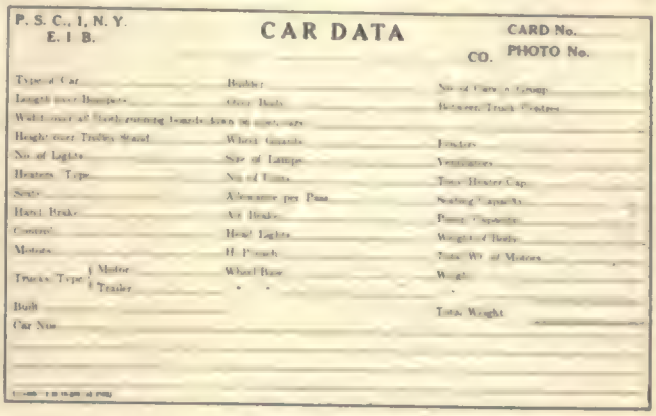


ORGANIZATION CHART OF FIRST DISTRICT PUBLIC SERVICE COMMISSION OF NEW YORK utility construction there is practically no overlapping with the inspection work of the Department of Water Supply, Gas and Electricity of New York City, which maintains a large inspection organization. The latter confines its activities, however, to the customers' wiring and appliances inside the meter connection, while the commission is interested in the distribution system as far as the service switch. For example, recording voltmeters are installed by this division from time to time in various sections of the city to make sure that proper voltage is being maintained, and both construction and service standards are insisted upon.

Appraisal.—The work of inventory and appraisal, always a very important feature of commission work, is no exception to the rule in the case of the first district. During the past ten years this staff has varied from eight to fifty employees and has completed valuations upon $300,000,000 worth of property. It has been impossible in many cases to make detailed appraisals because of inability to secure technical assistance sufficient for the task. Valuations made by outside engineering firms have been "spot checked" by commission representatives. It is hoped that a continuous inventory may be established and kept up to date in the near future for the large utilities. This is done with the small corporations only at present. With regard to depreciation reserves, often a controversial problem, this commission has consistently maintained the equity and justice of so-called "straight-line" method of setting aside a depreciation fund.

Accident Investigation and Equipment Inspection.—The public service commissions law definitely places upon the commission the duty of investigating the causes of all accidents which have resulted in loss of life, injury to persons or damage to property through the operation of public utilities under its jurisdiction and which, in its judgment, require investigation. Under this ruling utilities are required to report by telephone to the commission such accidents immediately after they occur, and to follow this up with a written report upon prescribed forms. The office is kept open twenty-four hours a day for the purpose of receiving the telephone reports. A monthly summary form used by the commission for the railway accidents is reproduced herewith. In this form the totals of accidents of each type reported for the ten months ended Oct. 31, 1919, have been filled in for reference purposes. This department handles an average of 3,500 reports per month, including those for light and power utilities, suitable but separate report forms being provided.

Car inspection, as carried on by this department, is accomplished by two inspectors for the railways of each of the large boroughs and one inspector for the Borough of Richmond. One office inspector in addition analyzes the reports as they are filed in the office and recommends necessary informal suggestions through the head of the department to the railway engineers and foremen. A portion of his time is devoted to the Long Island, the New York Central and the N. Y., N. H. & H. Railroads. These inspectors must necessarily have been engineers, assistant engineers of equipment or carhouse foremen with some large railway company before appointment to such a position.


P. S. C., 1, N. Y.
E. I. B.
CAR DATA
CARD No.
CO.
PHOTO No.

RECORDS OF EQUIPMENT ARE KEPT ON "CAR DATA" CARD

The field of the inspector is purposely limited to such local equipment as he may understand thoroughly in order that he may readily and intelligently pass upon the adequacy of repairs and the value of proposed improvements.

The inspection of rolling stock is carried on independently of any company inspection, although the schedule of the company with respect to frequency of inspections is followed as closely as possible. Normally each carhouse is visited for this purpose about once every three weeks. Records of car equipment are kept by inspectors on "Car Data" cards, illustrated herewith.

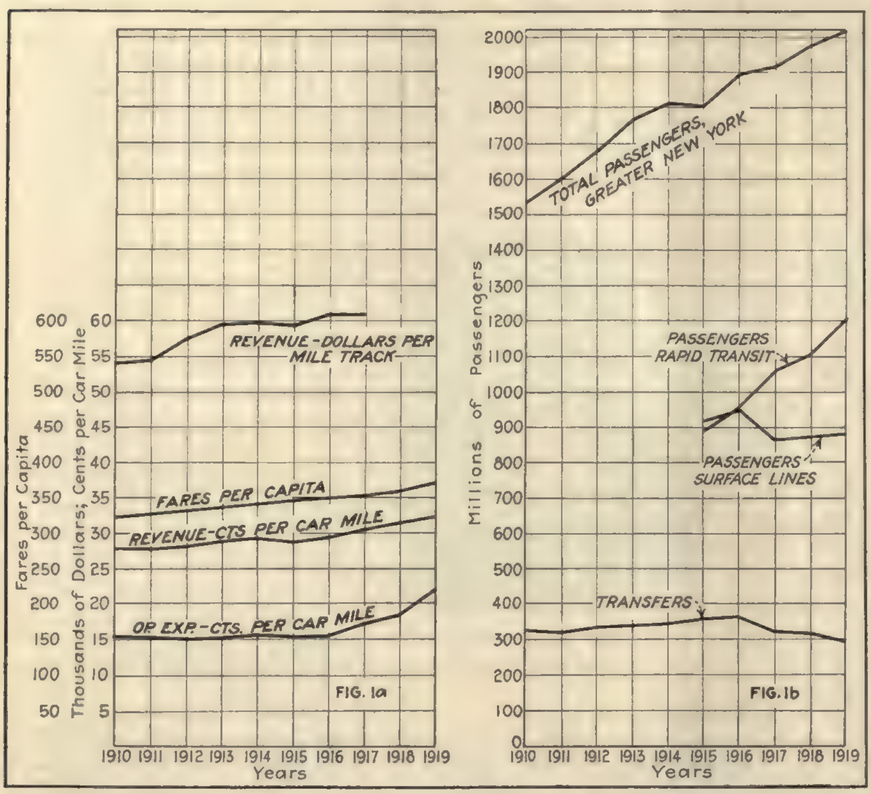
With the exception of serious conditions of equip-

MONTHLY "BROADSIDE" STATEMENT OF ELECTRIC RAILROADS OF GREATER NEW YORK

(March 1920)

Company	Number of Revenue Passengers	Free Transfers Collected	Revenue Car Mileage	Street Railway Operating Revenue	Street Railway Operating Expenses	Street Railway Operating Taxes	Street Railway Operating Income
Rapid transit lines:							
Interborough — Subway Division	56,777,391	N. R.	8,112,403	$3,039,539 62	$1,659,070 85	$37,372 84	$1,343,095 93
Interborough — Elevated Division	34,519,945	N. R.	6,296,997	1,837,021.73	1,170,642.36	191,438 85	474,939 52
New York Consolidated, Receiver (B.R.T.)	36,032,153	41,208	4,926,075	1,859,980 57	1,333,958 44	81,720 27	444,301 86
Total "Dual system"	127,329,489	41,208	19,335,475	$6,736,541 92	$4,163,671 65	$310,532 96	$2,262,337.31
Hudson & Manhattan	9,104,140		847,123	594,845 65	312,148 66	34,386 20	248,310 79
Total rapid transit	136,433,629	41,208	20,182,598	$7,331,387 57	$4,475,820 31	$344,919 16	$2,510,648 10
Street surface lines:							
Manhattan and the Bronx	33,364,116	3,622,030	3,492,842	$1,771,585 17	$1,783,285 76	$153,267 52	*D* $164,968 11
Richmond							
Richmond Light & Railroad	922,914	128,448	126,172	46,448.98	55,527.39	2,652 54	*D* 11,730 95
Total surface lines	73,164,325	8,130,003	8,631,003	$3,805,124 52	$3,833,033 90	$276,061 74	*D* $303,971.12
Grand total	209,597,954	8,171,211	28,813,601	$11,136,512 09	$8,308,854 21	$620,980 90	$2,206,676 98
Total, March, 1919	186,121,558	24,689,217	30,583,968	$9,704,202 01	$6,712,035 21	$600,259 64	$2,391,907 61
Increase or (*D*) decrease	23,476,396	*D* 16,518,006	*D* 1,770,367	$1,432,310.08	1,596,819.00	20,721.26	*D* 185,230 81
Per cent	12.61	*D* 66.90	*D* 5.79	14 76	23.79	3 45	*D* 7.74

"*D*" designates a deficit or decrease from corresponding month of preceding year.



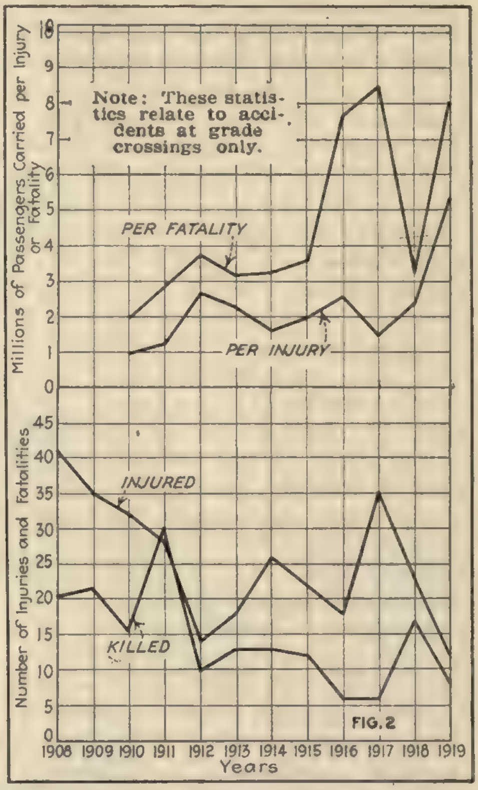


FIG. 1. THE DEPARTMENT OF STATISTICS AND ACCOUNTS PREPARES A REPORT OF ALL RAILWAYS IN NEW YORK CITY. FIG. 2. ACCIDENTS DUE TO GRADE CROSSINGS HAVE BEEN GREATLY REDUCED WHILE TRAFFIC HAS BEEN INCREASING

ment which may be immediately brought to the attention of the carhouse foremen by the inspector of the commission, the reports of such inspector are filed with the commission's departmental office for analysis. If, as a result of such a study of a series of either inspectors' or accident and service interruption reports, an epidemic of failures or accidents seems to be in evidence, the matter is informally taken up with the foreman or superintendent in charge. Only upon rare occasions of serious faults in equipment or of continued failure to correct weaknesses after informal suggestions have been made is a formal order issued by the commission. The policy is therefore one of co-operation, looking toward better service in which both commission and railway corporation are interested, rather than the declaration of many iron-clad rules to be arbitrarily enforced.

Complaints coming from outside sources regarding the condition or adequacy of the equipment are also followed up as special investigations by inspectors in addition to their routine duties.

The Division of Construction Accounts, within this department, investigates past, present and estimated future expenditures for construction work of the utility corporations for special reports to the department of statistics and accounts or direct to the commission. These reports are used in determining the amount of capitalization to be approved.

Engineering Statistics.—Quite apart from the work of the department of statistics and accounts, but acting in co-operation therewith, is the division of engineering statistics. In this division of the department of electrical equipment and inspection data and unit costs of materials and labor for all types of utility construction are determined, classified and tabulated. These are used principally in making appraisals. Costs of materials and labor are made up from the actual vouchers of the utilities as well as from market quotations. A historical record of unit and trend prices extending back to the organization of the commission in 1907 and in many instances to original values recorded by the corporation is maintained.

The Division of Power Equipment and Special Investigations has to do with special technical problems arising from complaints or questions of operation. It is, from a regulatory standpoint, one of the most important of the commission. Graduate engineers having had considerable general experience are necessary for the proper carrying out of the work. On account of the comparatively low salaries available from the State and with the great demand for engineers everywhere it has been impossible fully to man this division.

All new rate schedules, and riders to rate schedules which may affect rates, which are submitted to the commission for approval are referred to the electrical engineer. As the fundamental principles of such schedules are engineering problems, they are naturally worked out by this division.

Regulation and safety rules for the protection of employees in power plants are prepared. Inspections and studies leading to recommendations for emergency exits, telephone lines, signals and speed control, particularly upon subway and elevated roads, are carried on and problems of braking trains, brake-rigging and lubrication are investigated. Emergency lighting in cars by means of storage batteries, in the event of interruption of power supply, represents another important study. Recommendations are made leading to the provision of fire extinguishers in cars, the elimination of wooden cars and inflammable material from the subways, rearrangement of cables, etc.

Many engineering problems in connection with power plants and substations are involved in the work of this division, such as suggested changes in type, arrangement and rehabilitation of equipment, available capacity of generating and feeder systems and particularly the coal supply.

Attention of the Interstate Commerce Commission was called, as far back as March 30 of this year, to the impending shortage of coal this past summer. At the time the investigation was made, weekly shipments to New York utilities were 50,000 tons behind schedule and no start had been made during July upon the 480,000-ton coal reserve usually on hand at that time for winter. Car shipments were therefore traced and the commission informed from week to week regarding the fuel status.

Car studies made by this division, although considered as details by the traveling public, involve long and painstaking investigations. These include such matters as the relocation of bumpers and changes of draftgear to permit cars of one system to assist those of another in cases of emergency, improvements in motor suspension to avoid failure and delay of traffic, types of platform, gates, height of car steps, forms of wheel guards, fenders, etc.

Stations and other railway structures are examined with respect to their proper lighting, arrangement of platforms, exits, signs, locations of cables with respect to platforms and bridges, obstructions to traffic such as pillars, narrow clearances, etc.

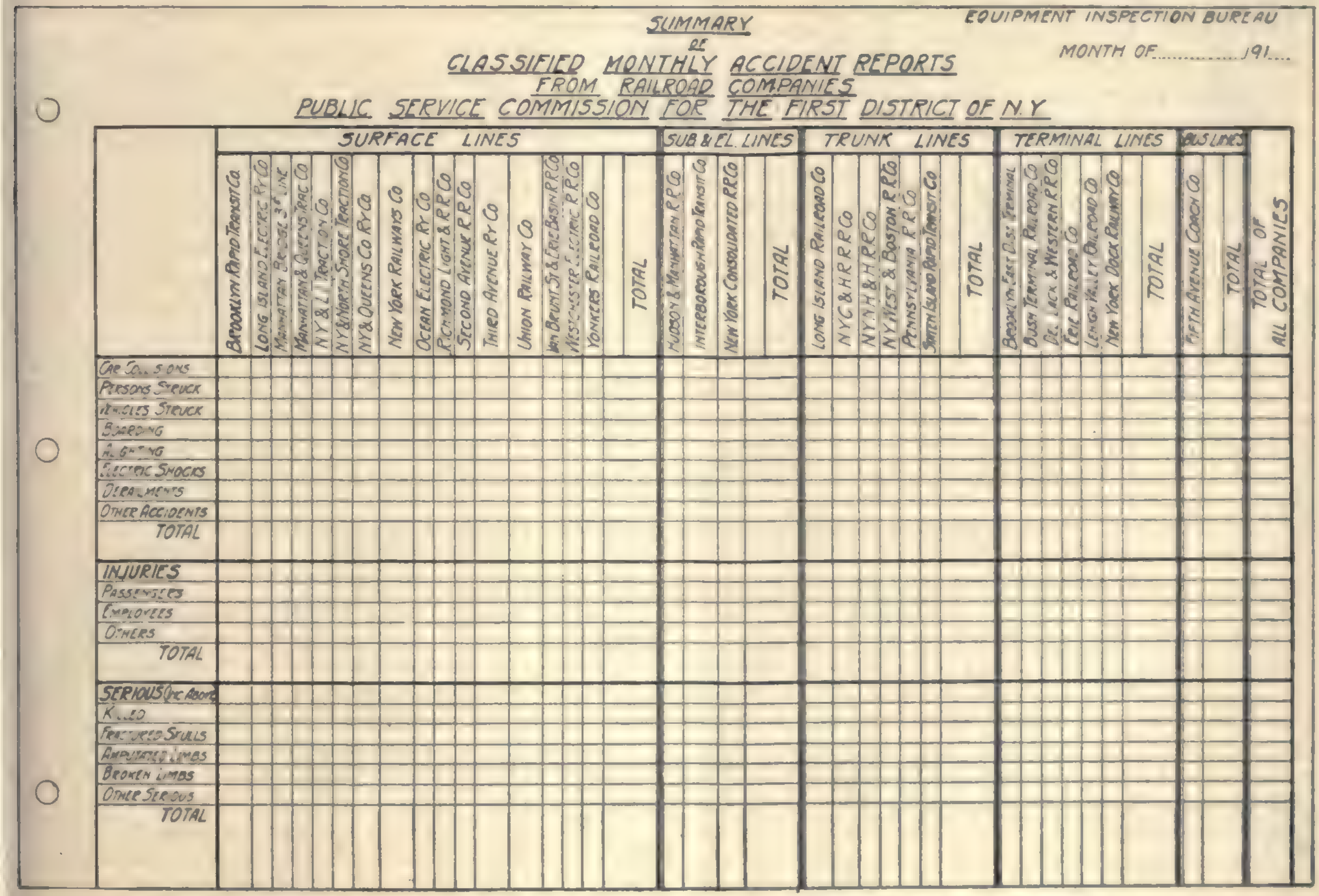
Track and Cable Inspection Division.—Two thousand miles of surface tracks and pavement are inspected and recommendations and estimates covering proposed rebuilding and maintenance are prepared by this division. Complaints, approximating 100 in number during the year 1919, relating to track conditions, speed of trains, signal conditions, stations, smoke nuisance, ventilation of trains, etc., were investigated and reported upon. Seventy-four route-miles of subway and nearly 1,100 elevated and subway stations were inspected during the year with respect to regular operating conditions and maintenance.

Division of Locomotive Boiler Inspection.—Inspectors of this division have reported upon the conditions of locomotive boilers within the district, analyzed in detail and classified the faults found therein. Reports are made to the railroad officials recommending repairs of these conditions.

DEPARTMENT OF GAS

This department operates in co-operation with the Department of Equipment and Electrical Engineering with respect to tests upon customers' electric watt-hour meters. Technical electrical problems are referred to the latter department, while routine tests resulting from complaints are carried on by Mr. Merrifield's organization.

In the case of gas meters, every meter is tested in the laboratory and sealed before it goes into service. A variation of plus or minus 2 per cent is allowed on gas meters and a possible error of plus or minus 4 per cent on electric meters. It is of interest to learn that of the electric meters tested last year the weighted average was found to be 1.5 per cent fast. In the case of the gas meters tested the weighted average was from 2.5 to 3 per cent slow. During the past year 3,100 gas complaints were handled, of which 1,250 involved meter tests. Only 242 electric meters were tested during this period. Nearly 300,000 gas meters were tested in 1919.



SUMMARY
OF
CLASSIFIED MONTHLY ACCIDENT REPORTS
FROM RAILROAD COMPANIES
PUBLIC SERVICE COMMISSION FOR THE FIRST DISTRICT OF N.Y

EQUIPMENT INSPECTION BUREAU

MONTH OF............191....

	SURFACE LINES																	
	Brooklyn Rapid Transit Co	Long Island Electric Ry Co	Manhattan Bridge 3¢ Line	Manhattan & Queens Trac Co	NY & L I Traction Co	NY & North Shore Traction Co	NY & Queens Co Ry Co	New York Railways Co	Ocean Electric Ry Co	Richmond Light & R R Co	Second Avenue R R Co	Third Avenue Ry Co	Union Railway Co	Van Brunt St & Erie Basin R R Co	Westchester Electric R R Co	Yonkers Railroad Co		TOTAL
Car Collisions																		
Persons Struck																		
Vehicles Struck																		
Boarding																		
Alighting																		
Electric Shocks																		
Derailments																		
Other Accidents																		
TOTAL																		
INJURIES																		
Passengers																		
Employees																		
Others																		
TOTAL																		
SERIOUS (Inc Above)																		
Killed																		
Fractured Skulls																		
Amputated Limbs																		
Broken Limbs																		
Other Serious																		
TOTAL																		

	SUB & EL. LINES					TRUNK LINES							
	Hudson & Manhattan R R Co	Interborough Rapid Transit Co	New York Consolidated R R Co		TOTAL	Long Island Railroad Co	N Y C & H R R R Co	N Y N H & H R R Co	N Y West & Boston R R Co	Pennsylvania R R Co	Staten Island Rapid Transit Co		TOTAL
Car Collisions													
Persons Struck													
Vehicles Struck													
Boarding													
Alighting													
Electric Shocks													
Derailments													
Other Accidents													
TOTAL													
INJURIES													
Passengers													
Employees													
Others													
TOTAL													
SERIOUS (Inc Above)													
Killed													
Fractured Skulls													
Amputated Limbs													
Broken Limbs													
Other Serious													
TOTAL													

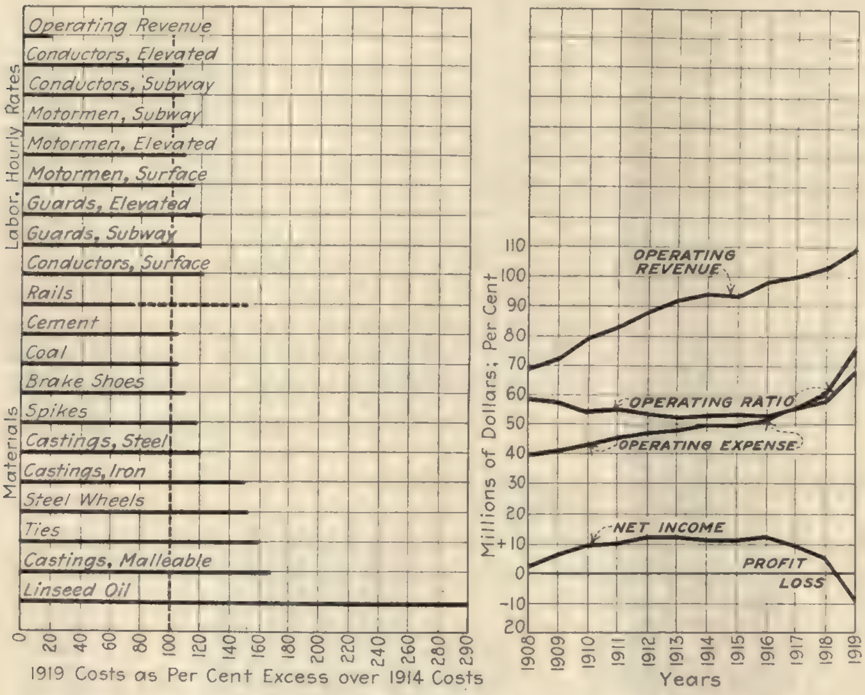
	TERMINAL LINES								BUS LINES			TOTAL OF ALL COMPANIES
	Brooklyn East Dist. Terminal	Bush Terminal Railroad Co	Del. Lack. & Western R R Co	Erie Railroad Co	Lehigh Valley Railroad Co	New York Dock Railway Co		TOTAL	Fifth Avenue Coach Co		TOTAL	
Car Collisions												
Persons Struck												
Vehicles Struck												
Boarding												
Alighting												
Electric Shocks												
Derailments												
Other Accidents												
TOTAL												
INJURIES												
Passengers												
Employees												
Others												
TOTAL												
SERIOUS (Inc Above)												
Killed												
Fractured Skulls												
Amputated Limbs												
Broken Limbs												
Other Serious												
TOTAL												

ACCIDENT REPORTS FOR THE MONTH ARE SUMMARIZED UPON THIS FORM

It is generally true that the gas complaints are far in excess of those upon the electric system. Such gas complaints are always greater in number during a period of general publicity in connection with a gas case before the commission, and reports from the second district indicate an interesting psychological effect manifested in a flood of 90 per cent of the total complaints located in the suburban district surrounding New York City when a rate case was being heard in the city itself.

In contrast to the policies of most other commissions, the fee, ranging from 50 cents to $2.50, depending upon the size of the meter, is returned to the consumer in a complaint case if the gas meter is found to be more than 2 per cent in error, while if the meter is within the permissible error the commission keeps the fee. In neither case does any portion of the fee revert to the utility.

The commission has not exercised its right to make tests of the quality of gas furnished by the utilities, although this is done by the city. No B.t.u. standard is prescribed, but the original candle-power basis using an open-flame burner is still in vogue. Gas pressure surveys are made by the commission's staff in an endeavor to assure a pressure between a minimum of 2 in. and a maximum of 6 in. of water. Recently it has been a difficult problem for the gas companies to maintain a satisfactory quality of gas. With a large portion of the gas necessarily manufactured from crude oil and the larger amounts of the gas-producing oil used either for gasoline or lubricants, the inflammable gas content of good quality has been greatly reduced.



"THE REASON WHY" INCREASED FARES ARE NEEDED IN NEW YORK

This department also handles complaints of consumers regarding their bills rendered by the utility. Investigation is made of the company's books and an adjustment recommended if an error is found. Application of consumers for extension of service beyond the existing distribution system are referred to this bureau for informal investigation. Formal petitions covering such matters are prepared later by the legal department.

Not to be confused with the work of the transit construction commissioner, previously outlined, is the transit bureau of the First District Commission. The organization of the latter includes an assistant chief inspector of stations, a supervising inspector, assistant supervising inspector and transit inspector.

Complaints regarding railway service involving the operation of trains and cars upon the surface, elevated and subway systems of the First District are referred for investigation to this transit bureau. Its functions also include the making of traffic surveys, the study of the adequate heating and ventilation of cars, station and terminal facilities, transfers, rates of fare, express and freight charges, etc.

During the year 1919 this bureau inspected the operating conditions upon thirty-eight lines of rapid transit railroads and 166 lines operated by the surface railway companies. It has investigated a total of 687 complaints regarding service and facilities upon these lines. This is a smaller number than has been filed in any previous year since the commission was created. The manner of handling these complaints and the policy of the commission with regard to the issuance of a minimum number of formal orders to remedy operating faults is the same as that described in connection with the inspection of rolling stock. In fact, the inspectors of the transit bureau and the division of accident investigation and equipment inspection work in co-operation on many of these problems before any report is made to the commission or to the railway corporation involved.

GRADE CROSSINGS

Until recently little attention has been given by the New York Legislature to appropriations for grade-crossing elimination in the first district. This was probably due to the fact that there are 8,000 such crossings in the second district as compared with 400 in the first district. The law of 1907 provides that the expense of such elimination in the first district should be apportioned one-fourth to the state, one-fourth to the city of New York and one-half to the railroad involved. Since that time the state has appropriated $950,000 as its share toward this work. As a result some badly needed improvements have been made in Flushing and Queens, L. I., and on Staten Island. Other work was held up under order of the Director-General of Railroads during the war, directed toward the elimination of capital expenditures. No appropriation has been made for this work since 1917. The commission has recommended some necessary changes upon the Far Rockaway branch of the Long Island Railroad, but differences of opinion between the public, desiring the depressed grade, costing more than $2,000,000, recommended by the commission, and the railroad officials, recommending an elevated structure, involving an expense of about $1,250,000, have delayed action up to this time.

The serious nature of the grade-crossing problem is evident from the accompanying chart indicating the number of grade-crossing accidents. It will be noted that the number of passengers transported per accident has been greatly increased during the last decade upon the road having the greatest number of grade crossings. The total accidents upon all the roads of the district have been greatly reduced as well. However, the increase of the injuries from eighteen to thirty-five in the year 1917 and the fatal accidents from six to seventeen upon one road in 1918, when large numbers of soldiers were being handled, indicate that further attention to this matter is necessary.

This commission, particularly through the interest and activity of its secretary, J. B. Walker, was largely responsible for the recommendation made by the National Association of Railroad and Utility Commissioners concerning the national adoption of uniform grade crossing gates, warning signs and watchmen's signals. The committee of this association, of which Mr. Walker was chairman in 1917, to which was assigned the duty of studying grade-crossing elimination and protection, in conference with a similar committee of the American Railroad Association, agreed upon the standard protective devices reproduced herewith, which have since been adopted by twenty of the forty-seven states having public service commissions. They include striped gates, watchmen's "Stop Signals," red lights, universally indicating "danger," at night and standard warning signs to be installed 300 ft. upon either side of all grade crossings.

These safety devices are provided by the railroads and delivered to the city, county or state authorities having control of the crossings, who are expected to install and maintain them. They are becoming well known already in New England, New York and Chicago districts.

SECRETARY'S DEPARTMENT

The secretary of the commission, James B. Walker, and Frank N. Robinson, assistant secretary, are the intermediary officials acting between the commission and the public. In the secretary's office reports of the various departments and rulings of the commission are given to the press and the annual report of the work of the commission is prepared.

Reporting to the secretary's office are to be found the following bureaus:

1. Calendar, minutes and proceedings.
2. Chief clerk.
3. Library and franchise records.
4. Printing and proofreading.
5. Filing.
6. Mailing.
7. Storeroom.

The bureau of calendar, minutes and proceedings, under the direction of Harry B. Mintz, junior assistant counsel, prepares a weekly calendar of the pending hearings scheduled for the commission. Emergency and very important hearings may be given special attention and notification to the public. Abstracts of the important decisions are made after a hearing in mimeograph form for the press, heads of departments and other interested parties. The complete minutes of the meeting are also written up for a permanent record. In addition a "document book" is prepared in narrative form covering the dates and features of interest.

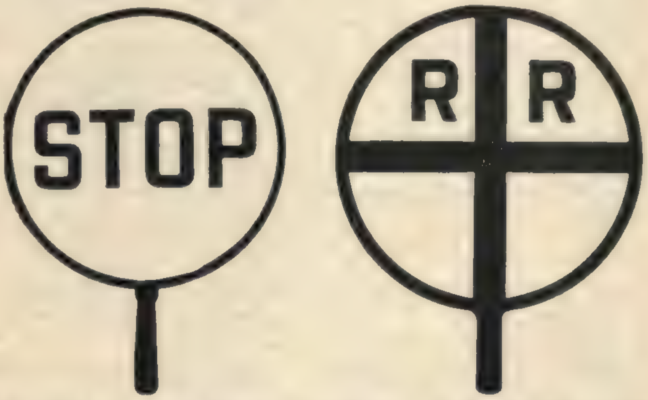
The chief clerk's office, under the direction of Joseph Higman, in co-operation with the auditor, is responsible for the bookkeeping, accounting, voucher system, etc., of the commission.

The bureau of library and franchise records, directed by Ralph R. Munroe, junior assistant counsel, established and for many years maintained a very complete library, comprising court and official commission decisions, corporation franchises, etc., for the combined regulatory and rapid transit construction activities. Recently an attempt has been made with some difficulty to separate the records of the two commissions. The files in this department contain some 10,000 documents of the corporations, together with a very valuable collection of track franchise maps indicating the ownership of the rights-of-way and track in the entire district. Accurate records of utility corporate names and lists of officials are also included in this department. An information bureau, carrying on research work looking toward franchise decisions, technical papers and reports, is also maintained.

The proofreading, filing, mailing and storeroom bureaus are self-explanatory, corresponding to departments bearing similar titles in other large offices.

RAILWAY PROBLEMS MOST ACUTE

The commission evidently recognizes the seriousness of the traction problem in New York City. This is clearly indicated in the following statement, which appears in its annual report for 1919:



STANDARD STOP SIGNS, ADOPTED LARGELY THROUGH THE EFFORTS OF MR. WALKER

> The year just closed has been a crucial one in the annals of street railroad operation throughout the country, and perhaps in no other place has the problem of continuing satisfactory operation in the face of steadily rising costs been so acute as it has been and is now in the city of New York. This is necessarily true from the nature of the local conditions. Greater New York has a population approaching 6,000,000 and an area of approximately 315 square miles, equivalent to a tract of 202,068 acres. With its unusual topographical conditions, a daily movement of nearly 3,000,000 people toward a common center in the morning and away from it in the evening is required, so that the industrial life of the metropolis is absolutely dependent upon the normal functioning of the transit systems. . . .
>
> For many years the street car fare in New York City has been constant at 5 cents. The people have been educated to a flat fare, irrespective of the distance covered. They cheerfully pay 5 cents for a ride of three blocks, and as cheerfully accept a ride of 21 miles for the same amount. Since the World War began, in 1914, the cost of operating these lines has been very considerably advanced. The companies pay more—in many cases 100 per cent more—for materials, for labor and for all other elements entering into the maintenance and operation of the street railroad system than they did five years ago. A subway motor car which cost $12,500 five years ago now costs $25,000. A double-truck trolley car, which could then be bought for $6,000, now costs $14,000. The ordinary laborer, who formerly received 20 cents an hour, is now getting upward of 40 cents, and skilled labor of all kinds demands and re-

ceives a corresponding increase in pay. Hence, the cost of maintaining, in good condition, every mile of track, every power house, every underground conduit and overhead trolley wire, every car in operation, has more than doubled in the last five years. Yet, notwithstanding the increased cost of operation, the revenues of the street railroads, generally speaking, have remained the same as they were before the war, except for additional income derived from the normal increase in traffic, which of course demanded additional expense for the extra facilities and equipment required to handle such increase. Efforts which the street railroads have made to obtain increased revenue by increasing fares have generally proved abortive. The reason for this is, on the one hand, the ruling of the Court of Appeals of this State in holding that the Public Service Commission had not been given power by the Legislature to permit increases in fares fixed by municipal franchises based on constitutional consents and, on the other hand, the reluctance of the present municipal administration of New York City to discuss changes in any existing contract which might entail an increase in fare.

Generally speaking, there is no question that the street railroads of the city need relief. Such relief, under present conditions, should come from such rates as would meet the cost of service, provided the companies make corresponding concessions to the public. Investigations of the situation have been sufficiently thorough to justify this statement. The measure of relief is a matter which can be determined only by a detailed investigation into each particular case.

Such an investigation was made by the commission upon request of the 1920 session of the Legislature and was reported upon in considerable detail on March 1, 1920. Some of the results depicted in curves reproduced herewith are very significant. In brief, the conclusion of the investigation is summed up by Commissioner Nixon as follows:

> It is not possible for all the traction companies to give adequate service at the present fare if present conditions continue.
>
> My recommendation in brief is that a flexible fare, based upon the cost of service, be established.

On Nov. 5 Mr. Nixon resigned and Governor Smith appointed Alfred M. Barrett, Deputy Commissioner, as his successor for the unexpired term.

Although the work of the commission is seen to be very diversified, comprising as it does many different types of utilities, the railway problem requires most of its attention. In second place, with respect to its serious financial condition, will be found the gas corporations. The electric light and power utilities, in general, are embarrassed during this period of reconstruction to a less extent.

Cornell Society of Engineers

IN LINE with the combining of all the colleges of engineering at Cornell University into one college of engineering, the Cornell Society of Civil Engineers has changed its name to the Cornell Society of Engineers and has amended the constitution to make all Cornell engineers eligible for membership.

The Cornell Society of Civil Engineers was started in 1905. Civil engineers only were eligible for membership. From its inception it has had the support of Cornell civil engineers and now has a membership list of 1,025. The executive committee has been enlarged to include the following graduates from the Sibley College of Mechanical Engineering: E. B. Katté, S. B. Whinery, W. W. Macon, S. C. Finch and R. W. Weed, Jr. I. W. McConnell, Dwight P. Robinson & Company, 125 East Forty-sixth Street, New York, is president. C. R. Harding, Southern Pacific Company, 165 Broadway, is secretary-treasurer.

The society holds occasional meetings and an annual banquet in January and has an employment committee.

Massachusetts Policies Considered

Commissioner Jackson and Manager Hood Talk About Present Needs Before New England Street Railway Club

THE Hon. James F. Jackson, chairman of the board of trustees of the Boston (Mass.) Elevated Railway, gave an encouraging address upon the electric railway outlook before the New England Street Railway Club Nov. 4. He touched upon his long and favorable opportunities for study of the electric traction situation as former chairman of the old Massachusetts Railroad Commission, later as counsel for the Eastern Massachusetts Street Railway and now associated with the direction of the Boston company. This experience led the speaker to conclude that today, as never before, the usefulness of the street railway is known and acknowledged. The public is now willing to help every honest effort to improve service. Patience must be exercised, however, as these betterments are worked out.

Mr. Jackson urged giving out more official statements explaining causes of service interruption, whether avoidable or not. "The struggle for the 5-cent fare is over," said the speaker, "and the industry is on its way upward. The climb will be long and hard, but the attainment of a new plane of finance and service is assured." He pointed out that if the bankers have all the facts, operating companies will find it much less difficult to obtain their needed credits. Employees also should be kept informed as to the facts and plans of their properties and have an opportunity to share in the advancement and problems of the organizations for which they work. The personal character of the platform man's skilled service was emphasized. Unless the men are courteous and alert, the wisdom of managers and executives will be of little avail. The speaker paid a high tribute to the growing spirit of co-operation among the employees of the Boston company and closed with an earnest plea for legislation to remove unjust paving and other burdens from operating companies. The public should be charged for service at proper cost.

Ralph D. Hood, general manager Massachusetts Northeastern Street Railway, addressed the club earlier in the day upon the early development of electric railways and their creative and executive personnel in New England. Coming to present-day problems, he urged the adoption of "a broad and comprehensive service-at-cost plan, that will apply to all companies in the state and apply in the same way in each of the states, with provisions enabling the state authorities to assess on each municipal community its share of the required income in locations where the service-at-cost plan will not function to the extent needed to make the plan a success. In the cases where the public authorities do not consider the line necessary from the standpoint of public necessity, then that line should be discontinued, thus lessening the burden to the company and the community and enabling the routes most needed to continue to function."

The Ontario Safety League has just issued, as special bulletin No. 62, a 17-in. x 22-in. poster, carrying in large letters this slogan: "Safety for all—All for safety." This legend is so simple, but so suggestive, that the poster is sure to attract attention to the safety movement throughout Ontario. Undoubtedly copies could be secured for use in the United States by addressing the league at Toronto.

How the Zone Fare Has Made Good at San Diego

In the Face of Low Density of Population, High Mileage of Track, an Amazing Number of Private Automobiles and a Decrease in Military and Naval Population, the Company Shows 40 per Cent More Revenue and 12 per Cent More Passengers for the First Nine Months of 1920 Against the Same Period of 1919

THAT the success of the zone fare on American electric railways is largely a matter of careful preparation and correct manufacturing and selling principles in determining the rates of fare appears to be proved by the happy experiences of the San Diego Electric Railway since its inauguration of a zone system Jan. 1, 1920.

Like many another modern American city, San Diego has a long way to go before the population will crowd its boundaries! It is a city of magnificent distances, being 4 miles wide by 24 miles long for a population just within 100,000. Furthermore, the terrain is broken up by several deep canyons which will make uniform development financially impracticable for years to come. Those who have had the good fortune to visit this beautiful city within the last three or four years will recall their astonishment at the large amount of vacant land between the railway station, the hotels and the business district—a condition which means that much of the so-called "close-in" territory is unproductive from a transportation standpoint.

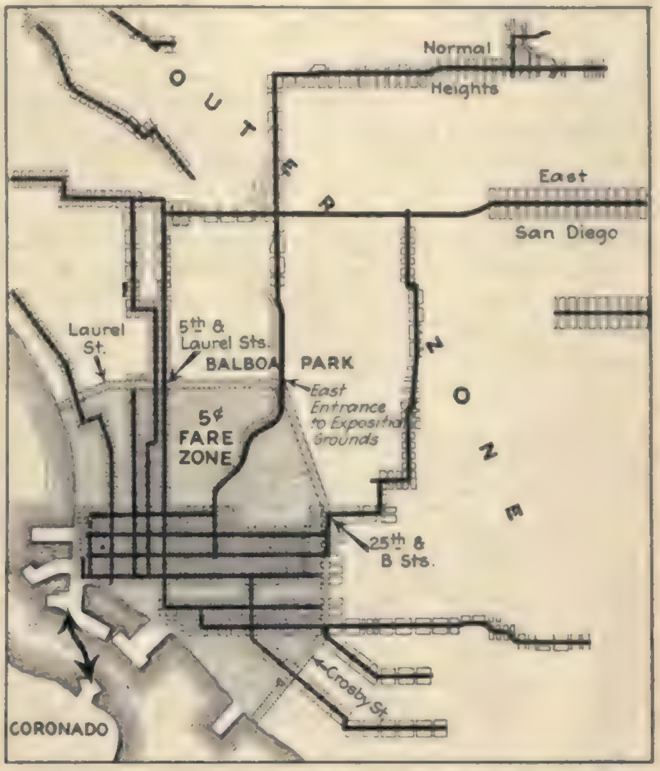
To aggravate the situation, the 1,400 acres of Balboa City Park (the home of the Panama-California Exposition) are plumped down in what is practically the center of San Diego. Hence all of the car service in this section of the city must circle the park in order to reach the outlying populated districts, thus increasing the length of haul through much intermediate, unproductive territory. To summarize the topographical situation in figures, Table I is presented, above.

TABLE I—TERRITORY SERVED BY SAN DIEGO ELECTRIC RAILWAY HAVING A TOTAL POPULATION OF APPROXIMATELY 100,000

Item:	Acres	Square Miles
Inhabited territory	7,527.80	11.76
Commercial and business district	518.80	0.81
Park and cemeteries	1,795.50	2.80
Larger vacant tracts	18,077.80	28.25
Water	10,707.20	16.73
Railroad and industrial yards	634.74	0.99
Total	39,261.84	61.34

RAILWAY SERVICE HAS BEEN LONG TOO LIBERAL

The financial history of the San Diego Electric Railway was presented in the ELECTRIC RAILWAY JOURNAL, Feb. 8, 1919, under the heading "Application No. 3808," which was the docket number given by the California Railroad Commission to the brief that formed the basis for permitting the zone fare system hereinafter described. It is enough to note here that this brief proved that the faith of the Spreckels interests in the transportation future of San Diego had not materialized in hard cold dollars; that few years had shown even a modest return on the investment and that over all there was a deficit that would require a long time to extinguish even under the most favorable conditions. To add to the irony of the situation, the railway was not permitted to serve all of the traffic offered, for the jitney was allowed to take thousands of dollars away from the San Diego company from July, 1914, to December, 1915. The company, for example, went to enormous expense to handle the anticipated rush of travel to the Panama-California Exposition of 1914 and then found that it had spent the money in vain. What the zone fare promises to do may therefore be gaged by the fact that July, 1920, was the first month "in the black" since 1913.



THIS MAP SHOWS THE WAY IN WHICH SAN DIEGO HAS BEEN DIVIDED INTO TWO FARE ZONES

Altogether the company has 95 miles of track for 100,000 people or approximately one mile per 1,050 persons, a pretty fair indication of ample provision for transportation, and the possession of some 160 passenger cars argues that such transportation actually is provided.

When the company made its application to the California commission for a fare increase, it expressed a preference for the zone system because of its advantage in appealing to the short-distance riders. The commission granted this request and established a two-zone system with a fare of 5 cents for a ride in either zone.

The 5-cent fare within the inner zone of San Diego includes free transfer privilege between any two points within this zone, provided that the journey does not involve travel into the outer zone. The boundaries of the inner zone are approximately 1 mile from Fifth Street and Broadway, the controlling center of street railway traffic in San Diego. This limit was not chosen arbitrarily, but was the result of an exhaustive traffic investigation which indicated that 1 mile or so was the proper boundary line for the inner-zone short haul. Departure from the 1-mile rule was made when a natural traffic dividing line intersected another line, or when a heavy loading point fell short or beyond the 1-mile measurement from the zero point.

The maximum length of ride possible within the inner zone is 3.5 miles, and the average actual distance traveled per passenger is approximately 1.3 miles.

The outer zone of the San Diego City Division extends from the boundary line of the inner zone to the ends of the respective routes. Here, too, the fare is 5 cents, with the privilege of a free transfer between any two points of the outer zone provided that no part of the journey is made within the inner zone. The maximum length of ride possible within the outer zone on the 5-cent fare is 7 miles, and the average actual distance traveled per passenger is approximately 3 miles.

Three reasons may be assigned for favoring the suburban riders: First, most of them pay also the shorter-ride fare of the inner zone in any event; second, there is plenty of room for any outer-zone traffic that may be created by retaining the 5-cent fare; third, undue hardship in changing from flat to zone fares is avoided.

TABLE II

Showing Number of Cash Fare and Revenue Ticket Passengers, Transfer Passengers, Total Revenue Passengers, Revenue from Transportation of Passengers, and Car-Miles Operated for the Six-Month Period, January-June, Inclusive, for the Years 1911-1920 inclusive.
All Numbers in Thousands

Year	Cash Fare Revenue Ticket Passengers	Transfer Passengers	Total Revenue Passengers	Revenue From Transportation of Passengers	Car-Miles Operated
1911	6,528	1,510	8,038	$298	1,213
1912	8,642	2,088	10,681	399	1,437
1913	10,853	2,704	13,558	503	1,749
1914	10,120	2,638	12,759	467	1,781
1915	10,680	2,955	13,636	490	1,971
1916	9,974	2,308	12,282	462	1,769
1917	8,948	1,730	10,679	428	1,784
1918	10,970	1,572	12,543	527	1,838
1919	10,189	1,634	11,823	486	1,768
1920	10,144	1,813	11,958	643	1,873
Average 1911-19	9,656	2,121	11,778	$451	1,701
Increase 1920 Over Average Amount	487	307*	180	$191	171
Per Cent	5.05	14.51*	1.53	42.49	10.08

*Decrease.

The rates for a journey originating in one zone and ending in the other are as follows:

1. 10 cents cash, including transfer privileges, on the San Diego City Division. It is a very casual passenger indeed who pays a 10-cent cash fare, for, in the six months Jan. 1-June 30, 1920, under review, this class constituted but 4.67 per cent of the traffic and provided only 7.36 per cent of the revenue from transportation.

2. 7½-cent tickets, sold by all conductors and throughout the city, four tickets to a strip, including the same privileges as the 10-cent cash fare. This was the fare paid by 39.13 per cent of the two-zone passengers in the period named and was responsible for 46.26 per cent of the transportation revenue. On the sale of this ticket, the platform men receive a commission of 3 per cent—a stimulus which has proved so effective that more than 95 per cent of all 7½-cent tickets are sold by the conductors. This 3 per cent goes into a fund in which the men share monthly on the basis of the numbers of hours worked. The platform men are charged with so many books of tickets as received, and accounting is simple, since each man is responsible for either the return of the tickets or cash corresponding to the number sold. The sale of four tickets at a time, it is thought, will induce four-times-a-day instead of twice-a-day riding.

TABLE III

Showing Increase or Decrease of Total Revenue Passengers Carried During the First Six Months, January-June, 1920, as Compared with the Corresponding Periods for the Years 1911-1919, Inclusive

1920 Compared with	Number Increase or Decrease	Per Cent Increase or Decrease	Amount Increase	Per Cent Increase
1911	3,919,191	48.75	$345,211	115.70
1912	1,276,883	11.95	243,937	61.04
1913	1,599,871*	11.80*	139,787	27.75
1914	801,397*	6.28*	176,170	37.69
1915	1,678,146*	12.31*	153,008	31.19
1916	324,483*	2.64*	180,738	39.05
1917	1,279,082	11.98	215,521	50.35
1918	585,178*	4.67*	115,809	21.94
1919	134,265	1.14	157,090	32.29
Average 1911-1919	180,038	1.53	191,919	42.49

*Decrease.

3. Calendar-month commutation book, good for two rides on each day of the calendar month on date printed thereon, sold at $4, or 6½ cents per ride if all tickets are used, and including full transfer privileges as in the case of the 10-cent cash and 7½-cent ticket fares. The San Diego commutation book varies from most steam railroad books in at least three important aspects: The book is good for the calendar month only; it is not limited to the original purchaser and the individual tickets are good only on the day specified. The first condition avoids complex bookkeeping; the second avoids friction with the public, for even on the comparatively few trains of a steam railroad it is impracticable to check fraudulent presentation of commutation tickets and it would be hopeless to do so on a street railway with its greater frequency of operating units; the third condition definitely implies that any holder of the ticket is entitled to two rides taken on the same day. Considering the practical fact that most commuters would miss out several times a month, as on holidays, the difference in cost between this ticket and the 7½-cent ticket is really trifling. Commutation books are sold only at the ticket office, and the total of both 6½-cent and 6⅓-cent (school, etc.) kinds accounted for only 3.55 per cent of the traffic and 3.93 per cent of the transportation revenue in the six months Jan. 1-June 30, 1920.

TABLE IV

Showing Revenue Passengers Carried per Car-Mile, Revenue per Car-Mile, Revenue per Cash Fare and Revenue Ticket Passenger and Revenue per Total Revenue Passenger During the Six-Month Period, January-June, Inclusive, for the Years 1911-1920 Inclusive

Year	Revenue Passenger per Car-Mile	Revenue per Car-Mile (Cents)	Revenue per Cash Fare and Revenue Ticket Passenger (Cents)	Revenue per Total Revenue Passenger (Cents)
1911	6.62	24.58	4.57	3.71
1912	7.43	27.80	4.62	3.74
1913	7.75	28.80	4.64	3.72
1914	7.16	26.24	4.62	3.66
1915	6.92	24.88	4.58	3.60
1916	6.94	26.16	4.64	3.77
1917	5.98	23.98	4.78	4.01
1918	6.82	28.70	4.81	4.21
1919	6.69	27.51	4.77	4.11
1920	6.38	34.34	6.34	5.38
Average 1911-1919	6.92	26 52	4.67	3.84
Increase 1920 Over Average Amount	0.54*	7.82	1.67	1.54
Per Cent	7.80*	29.49	35.76	40.10

*Decrease.

Special zone fares are in use on the other divisions based on the same general principles.

Between the period 1892-1919 inclusive, a universal fare of 5 cents was charged between points on San Diego City lines, except certain special fares, such as school tickets, and joint rates to and from the Coronado, National City and Point Loma Division points. Indeed, in some cases the 5-cent area extended beyond the generous limits of San Diego.

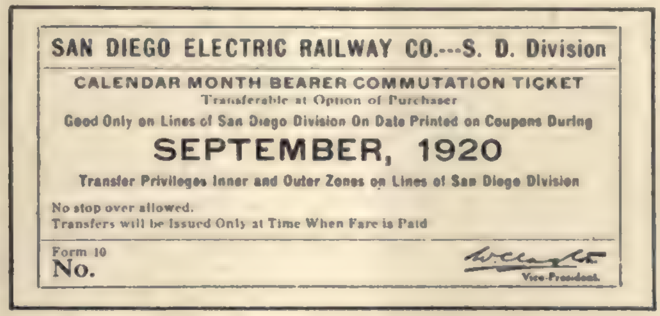
The principal features of "Selling the Zone Fare Idea" were related quite fully in the ELECTRIC RAILWAY JOURNAL for Aug. 7, 1920, page 269, some of the methods employed being most unique. The way in which the fare is collected is described in one of the advertisements of the company as follows:

Inbound—Pay-as-You-Enter

Inbound, from outlying terminals into town and through to downtown terminals, all fares will be collected and transfers issued as passengers board cars. While cars are operating inbound in the outer zone, passenger's identification check punched to show destination to which fare is paid (either "Outer Zone Only" or "Inner and Outer Zone") will be issued to each passenger.

At designated points on different lines and just before arriving at inner zone, conductors will go through cars and take up all of the passengers' identification checks.

Where the passenger has paid only an outer zone fare and expects to ride into the inner zone, the balance of fare will be collected by conductors.



SAN DIEGO ELECTRIC RAILWAY CO.---S. D. Division

CALENDAR MONTH BEARER COMMUTATION TICKET

Transferable at Option of Purchaser

Good Only on Lines of San Diego Division On Date Printed on Coupons During

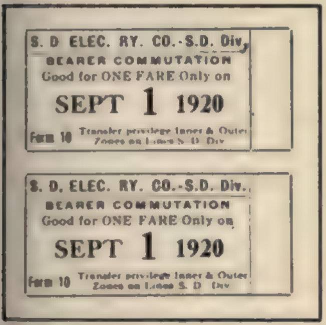
SEPTEMBER, 1920

Transfer Privileges Inner and Outer Zones on Lines of San Diego Division

No stop over allowed.
Transfers will be Issued Only at Time When Fare is Paid

Form 10
No.

Vice-President.



S. D ELEC. RY. CO.-S.D. Div.
BEARER COMMUTATION
Good for ONE FARE Only on
SEPT 1 1920
Form 10 Transfer privilege Inner & Outer Zones on Lines S. D. Div

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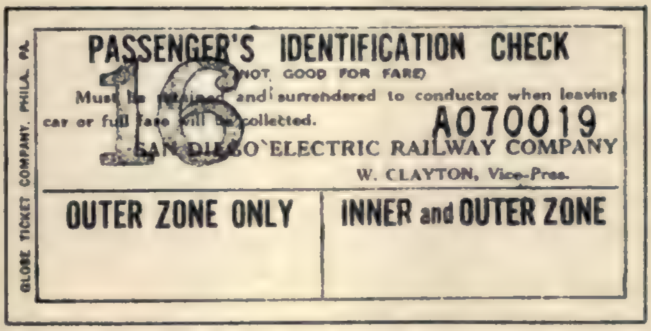


PASSENGER'S IDENTIFICATION CHECK

(NOT GOOD FOR FARE)

Must be retained and surrendered to conductor when leaving car or full fare will be collected.

16

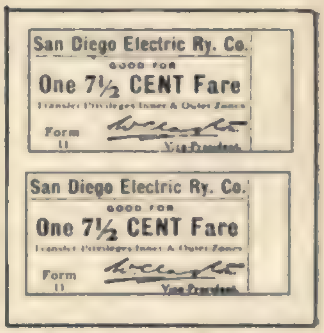
A070019

SAN DIEGO ELECTRIC RAILWAY COMPANY

W. CLAYTON, Vice-Pres.

OUTER ZONE ONLY	INNER and OUTER ZONE

GLOBE TICKET COMPANY. PHILA. PA.



San Diego Electric Ry. Co.
GOOD FOR
One 7½ CENT Fare
Transfer Privileges Inner & Outer Zones
Form 11
Vice-President.

San Diego Electric Ry. Co.
GOOD FOR
One 7½ CENT Fare
Transfer Privileges Inner & Outer Zones
Form 11
Vice-President.

LOWER ROW—COMMUTATION COUPONS, IDENTIFICATION CHECK ISSUED IN OUTER ZONE TO INBOUND PASSENGERS, 7½-CENT TICKET SOLD IN STRIPS OF FOUR. UPPER ROW—COVER OF COMMUTATION BOOK

While car is operating in the inner zone, the use of passengers' identification checks will not be necessary. Fare collections on routes numbers 6, 9 and 10 operating exclusively in inner zone will be the same as at present. Passengers are earnestly requested to retain identification checks, without crumpling them up or folding, until surrendering same to conductor. This applies also to transfers, and the co-operation of patrons will avoid delay or inconvenience to fellow passengers.

Outbound—Pay-as-You-Leave

Outbound, all passengers will pay as they leave cars from downtown terminals to ends of all city lines. At downtown points where any number of passengers are to board cars and none to alight, they will be permitted to board cars at both center entrance and exit gates as well as motorman's exit gate, in order to avoid delay and permit prompt handling of heavy travel.

All passengers when ready to alight will leave via the center-entrance gate, where conductor will collect fares. (Exit gate will be closed.)

Patrons boarding cars in the inner zone will not require identification checks, but will pay the 5-cent fare, inner zone ticket or transfer as they alight in the inner zone, or full fare or ticket as they alight in outer zone.

All passengers who board cars after leaving inner zone will receive identification checks punched "Outer Zone Only" as they enter car, and only a 5-cent fare will be collected when they surrender identification check on leaving car.

In the plan of fare collection adopted there will be but one fare collection per passenger per trip.

In connection with the foregoing procedure it will be observed that it is the duty of the conductor to go through the car at the zone boundary to take up identification slips and collect excess fare. In practice the conductor has no trouble in doing this, because the space from three to four blocks, when the inner zone is approached inbound, is a walking zone with practically no passengers leaving or boarding the car.

Another interesting point in the San Diego procedure is that the pay-leave scheme for outbound passengers makes it possible to fill up outbound cars almost instantaneously.

No fare boxes are used at present. Fare registers, however, show 5-cent fares on one side and tickets and transfers on the other. The comparatively few 10-cent cash fares are rung up on a neck register. In the new scheme, the Johnson fare box will count 5- and 10-cent cash fares and 7½-cent and school metal tokens, while pennies will be locked up and all paper transfers will be canceled as they are dropped in the box by the passengers. The transfers used are issued in three colors, which are sufficient to prevent looping under San Diego routing conditions. Rose is used for the inner zone, manila is used for the outer zone, and buff for both zones.

THE RESULTS IN MONEY AND TRAFFIC

The management knows no local conditions during the last twelve months which would tend to stimulate traffic. In fact, there was a decrease during the first six months of 1920 as compared with the first six months of 1919 just after the war in the number of young, freely riding men, who were stationed at Camp Kearney, North Island, and other military points. Nevertheless, during the first three months of the present fare system there was a decrease of only 2 per cent in riding; in April there was an increase of 1 per cent and in May of 5 per cent. For the entire six months to June 30, 1920, the passengers increased 134,265, or 1.14 per cent over the corresponding six months of 1919. Rough estimates for the periods ended Sept. 30 are for an increase of approximately 12 per cent in the passengers and 40 per cent increase in revenue from transportation.

The accompanying tables give in some detail various other statistics. It is interesting to note in Table IV that the average receipt in cash fares and tickets per revenue passenger was 6.34 cents in 1920, as compared with 4.77 cents in 1917, an increase of 33.12 per cent. It is also interesting to note, when the 1920 figure is compared with the average of previous years, that these previous years have all been fairly close to the average. On the other hand, each of the six months of 1920 has been pretty close to the average of the whole six months.

TABLE V

Showing Total Revenue Passengers Carried (Exclusive of Transfers) by Classes and Revenue Received from Transportation of Each Class for the Six-Month Period, January-June, 1920.

	Passengers Carried		Revenue Collected	
Rate of Fare	Number	Per Cent	Amount	Per Cent
1⅔ to 2½ cent fares	426,268	4.20	$11,209	1.74
3¾ cent fares	778,367	7.67	29,188	4.53
5 cent fares	3,849,783	37.95	192,510	29.91
6¼ to 6½ cent fares	359,964	3.55	25,290	3.93
7½ cent fares	3,969,429	39.13	297,707	46.26
10 cent fares	473,632	4.67	47,363	7.36
12½ to 15 cent fares	225,145	2.22	28,808	4.47
17½ to 25 cent fares	61,819	0.61	11,587	1.80
Total	10,144,407	100.00	$643,665	100.00
Passengers carried at fares from 1⅔ cents to 5 cents, inclusive	5,054,418 =	49.83% or	$232,906 =	36.18
Passengers carried at fares over 5 cents	5,089,989 =	50.17% or	410,759 =	63.82
Total	10,144,407 =	100.00%	643,665 =	100.00
Average fare per passenger 5 cents and under	4.60			
Average fare over 5 cents	8.07			
Average fare per passenger	6.35			

NOTE—Fares below 5 cents are school tickets.

TABLE VI

Showing Income, Outgo, Net Available for Fixed Charges, Fixed Charges and Net Income to Profit and Loss of the San Diego Electric Railway Company for the First Six Months, January-June, 1920, Compared with the Average of the Corresponding Period for the Years 1916-1919, Inclusive

	First Six Months January-June, 1920		Avg. First Six Mos. January-June, 1916-1919		Increase or Decrease	
Item	Amount	%	Amount	%	Amount	%
Income						
Revenue from transp. of passengers	$643,583	94.75	$476,295	93.40	$167,290	35.12
Other rev. from transp.	521	0.09	1,168	0.23	646	55.38
Revenue from other ry. operation	28,455	4.20	26,201	5.14	2,253	8.60
Non-operating income	6,399	0.96	6,277	1.23	121	1.94
Total income	$678,958	100.00	$509,940	100.00	$169,018	33.14
Outgo						
Way and structures	31,527	4.64	$29,275	5.74	$2,252	7.69
Equipment	32,020	4.72	22,386	4.39	9,635	43.03
Power	92,951	13.69	63,775	12.50	29,176	45.74
Conducting transportation	208,385	30.69	146,495	28.73	61,890	42.25
Traffic	11,059	1.63	7,633	1.50	3,425	44.87
General and miscellaneous	82,458	12.15	64,047	12.56	18,411	28.75
Transportation for inv., cr.	*426	†0.06	*160	*0.03	*265	166.80*
Operating expenses	$457,976	67.46	$333,453	65.39	$124,523	37.34
Depreciation	136,960	20.17	150,649	29.54	13,689*	9.09*
Taxes	43,057	6.34	35,990	7.06	7,066	19 63
Total outgo	$637,993	93.97	$520,093	101.99	$117,900	22.67
Net available for fixed charges	$40,964	6.03	$10,153*	1.99*	$51,118	503.43
Fixed Charges						
Interest on funded debt	$93,100	13.71	$95,806	18.78	$2,706*	2.82*
Interest on unfunded debt	......	......	5	......	5*	100 00*
Amort. of disc't on funded debt	7,161	1.05	7,369	1.45	208*	2.83*
Sinking fund (bond retirement)	29,400	4.33	19,600	3.84	9,800	50 00
Miscellaneous	25	......	60	0.02	35*	58.77*
Total fixed charges	$129,686	19.10	$122,841	24.00	$6,844	5.57
Net income to profit and loss	†$88,721	†13.07	†$132,994	†26.08	$44,273	33.29

* Credit † Deficit.

The analysis in Table V brings out the striking point that 50 per cent of the total passengers were carried on a fare from 1⅔ cents to 5 cents, an average of 4.6 cents, and that this fare constituted 36.18 per cent of the total revenue. This table also shows what a large percentage of the fares were nickels, dimes and tickets, and consequently how little time was probably consumed by the conductors in making change. Table VI gives the complete financial statement for the period mentioned. During July, 1920, for which figures in detail are not yet available, the earnings for the first time since 1914 met every proper financial requirement. Other interesting features of the financial report for the first four months of 1920 will be found in the ELECTRIC RAILWAY JOURNAL for Aug. 7, 1920, page 270.

CONCLUSION

According to advices from E. J. Burns, who has had a large share in working out the new method, the zone system as adopted and in operation in San Diego has not affected the population or disturbed real estate values. From the date of its inauguration there has been no complaint or opposition from the public. As stated above, it is considered by the traveling public to be a workable and dependable system. The public does not consider the zone system complicated, but one collection of fare per passenger per trip on all lines is made, and, due to the efforts of the company to advise the public in advance as to the reason of the system, the method of fare collection, etc., there has been practically no confusion at any time since the system was installed.

Edward Dana on Boston Traction Problems

EDWARD DANA, general manager Boston Elevated Railway, has an article in the October issue of *American Business & National Acceptance Journal* entitled "The Street Railway Problem Must Be Solved Correctly if Cities Are to Prosper." After reciting the steps under which the fare in Boston has gradually been increased from 5 cents to 10 cents, Mr. Dana declared that while a property might derive sufficient revenue at a high flat fare out of necessity riding to meet the cost of service, the street railway under such conditions has been diverted from its primary function, namely, that of developing community growth and intercourse for the greatest number of its inhabitants and has become a commodity which can be purchased only by those who can afford it or to whom at any price it is indispensable.

Continuing, Mr. Dana said that on the Boston Elevated Railway the 10-cent fare became effective in July, 1919. During the following twelve months, or those ended June 30, 1920, there was a 25 per cent increase in wages and a winter of unparalleled severity, entailing a direct outlay for snow removal of $600,000, with other indirect expenses. The car-miles run were 1,704,292 less than during the previous year and the balance sheet at the end of the year on a $32,671,000 income was $17,000 on the right side. But wages have again been increased by a board of arbitration, this time 16⅔ per cent, and prices of coal and other supplies are steadily increasing, so that the outcome for the present year cannot be foretold.

In Mr. Dana's opinion, the high flat fare is not the final solution, even if thereby the street railway becomes self-supporting, if it becomes less the public servant. Permanent results can be obtained in such a case only by the proper distribution of the burden between the car rider and the taxpayer, with a fair and safe return to those who provide the capital and with management entirely removed from politics and held to a proper degree of skill and economy.

Utility Commissioners Hold Spirited Convention

National Association of Railroad & Utility Commissioners Discusses Vital Problems of Rates, Public Relations and Valuation, Devotes Particular Attention to Electric Railways, Favors Liberal Rates, Encourages Publicity and Calls on Local Bankers to Appear Publicly at Hearings to Prevent Socialism

THAT utilities commissioners throughout the country have come to recognize that public corporations are entitled to more sympathetic consideration of their problems became very evident during the sessions of the annual convention of the National Association of Railway & Utility Commissioners, which was held in Washington this week. It also developed at the round table discussion on street railways that it was very generally agreed among the commissioners in attendance that such railways are entitled to a higher rate of fare and that utility rates generally must be revised upward in the public interest.

A flat-footed declaration against government ownership of railroads by P. J. Lucey of the Illinois commission brought forth such expressions of approval that it may be stated that much more than a majority of those present regard the trial of government operation as discrediting any plan of public ownership of railroads. This display of sentiment against government ownership is greatly in contrast with the opinions held by many of the commissioners five years ago.

The convention adhered to its established policy of making the annual meeting a clearing house for the views of the members of the organization. Numerous reports were submitted and discussed, but as usual the convention does not adopt or pass upon these reports in any way. The sessions this year, according to James B. Walker, the secretary of the association, were of unprecedented interest, reflecting the unusually large number of important problems which face all types of railway and utility operations.

The address of Commissioner Clyde B. Aitchison on car distribution aroused an animated discussion, in which Commissioner Frank H. Funk of Illinois, Judge Clyde M. Reed of Kansas and Commissioner Charles Webster of Iowa took clear-cut issue with the car distribution policies of the Interstate Commerce Commission. It was alleged that this policy had led to great losses in the wheat-producing sections of the country.

Officers for the coming year were elected as follows: James A. Perry of the Georgia commission, president; Carl D. Jackson of the Wisconsin commission, first vice-president; Dwight N. Lewis of the Iowa commission, second vice-president. James B. Walker of the First District New York commission was re-elected secretary of the association. Le Roy S. Boyd, librarian of the Interstate Commerce Commission, was re-elected assistant secretary.

Next year's convention is to be held in Atlanta, Ga., commencing the second Tuesday in October.

ADDRESS OF PRESIDENT SHAW

The address of President Walter A. Shaw of Illinois at the opening session of the National Association of Railway & Utility Commissioners was devoted largely to a discussion of the relations between the utilities and the commissions and to those between the state commissions and the Interstate Commerce Commission. In Mr. Shaw's opinion the acceptance by the public of the large increases in railroad rates recently granted by the Interstate Commerce Commission is evidence that the public is convinced that substantial relief is necessary to the carriers to permit them properly to serve the country. These colossal increases, which before the war would have spelled political defeat to any commission advocating them, show vividly how times have changed. Other excerpts from Mr. Shaw's address follow:

Within the past two or three years there have been considerable demands upon state commissions to increase all classes of rates coming within their jurisdiction, and many substantial increases have been authorized. In most instances, especially as to street railway fares, the increases authorized have exceeded those prescribed by so-called contract ordinances or franchises granted prior to the creation of the state commissions. The abrogation of many of these franchise provisions has been seized upon by self-seeking politicians with the idea of furthering their own selfish ends by making the commissions unpopular because the rates have been increased. The utility corporations are pictured as contract breakers which prospered unduly before the war and are now unwilling to share their part of the burdens brought on by it, and that if it were not for the state commissions these contracts would be binding and the public would not be required to pay the increased rates. These individuals conveniently forget to tell the public that in the absence of commissions utility corporations have the right to resort to the courts, which would fix the rates under provisions in the federal and state constitutions that prohibit the confiscation of property without due process of law. Such procedure has been adopted by certain carriers in obtaining increased passenger rates in Illinois and other states.

Apparently sight was also entirely lost of the fact that the state commissions were created for the very purpose of breaking so-called ordinance contracts. In the pre-war period the public believed that many of these rates were excessive and necessarily, if the state commission was to give any relief, the rates prescribed by ordinances or otherwise must be disregarded. In the pre-war period the test applied to determine the popularity of the commission was the extent to which it lowered rates and broke so-called contracts.

In the speaker's judgment, among the many enemies of regulation three are of principal importance, and of these the greatest is politics. Complete changes in the personnel of a commission with the advent of a new governor means, in the long run, defeat to regulatory efficiency, and the speaker recommended that the association give this matter special attention either by a resolution adopted at the convention or by creating a committee to consider it, and then take appropriate action upon its report. The second most powerful enemy of regulation listed was the group which believes that all utilities should be owned and operated by the federal or state government or their duly authorized agents. The third principal enemy of regulation is the improper attitude of many utilities toward the public. In the speaker's opinion, unless the public shall receive at least as good service and as low a rate through a regulated monopoly as it would receive under the whip of competition regulation will fail and some form of government ownership will prevail. In this connection the speaker said that he had in mind the position taken by many companies in rate proceedings during the war, and even at this time that for rate making purposes value should be determined by the use of the present inflated war prices, and he quoted former Justice Charles E. Hughes, when acting as referee in the case of Brooklyn Borough Gas Company vs. Public Service Commission, as follows:

> This would result in allowing a public service corporation to take advantage of a public calamity by increasing its rates above what would be a liberal return not only on actual investment but upon a normal reproduction cost, in the view that unless it could make an essentially exorbitant demand upon the public it would be deprived of its property without due process of law.

There is also a responsibility on those who direct the financial policies of our utility corporations and financial institutions. The latter have important interests in the future success of the utilities in the way of protecting the securities now owned or held by them, and they might well greatly profit by a campaign of education, assuming their just portion of the burden and risk and educating the public to that fact.

The speaker then discussed the conflict between federal and state authorities in regard to rate supervision, but expressed the belief that it would be possible to iron out much of the troubles if both federal and state commissions made an honest endeavor to carry out the spirit and intent of the co-operative provision in the transportation act of 1920. But he added that if the carriers insisted on continuing warfare against state authority the association should use every honorable means to protect the rights to which each state is entitled under the constitution. He then suggested a committee on litigation to deal with such matters and that proper attention be given to possible clarifying amendments to the interstate commerce commission act, particularly as to land values in valuations.

SOME COMMITTEE REPORTS

The conclusion of the committee on public ownership and operation was that the "present system of private ownership and private ownership with public regulation, as is now the custom in this country, is the proper, logical, and, indeed, the only just and honest manner of conducting the public utility business of this country." The report pointed out a number of the weaknesses of government ownership of utilities, which, it said, were advocated by two classes. One is made up of the communists, the anarchists, and all others who follow the divers and various governmental vagaries with which they seek to supplant our constitutional government. The other general class is the dreamer, the visionary, the professor who deals in ideals but not facts and is opposed to private ownership and governmental regulation, because they both feel that should this project fail nothing will remain but public ownership and public operation.

The report of the committee on safety of operation of public utility companies declared that thirty-one of the forty-eight state commissions have more or less jurisdiction over the safety of operation of public utility companies, eleven have no control, and six have not yet reported. Brief mention is made of some of the safety regulations in force in the different states, as well as of the safety rules for electrical properties developed by the Bureau of Standards in co-operation with national engineering associations and others. The report says that within the past nine years forty-two states have adopted workmen's compensation laws and thirty-seven states have established accident boards or industrial commissions. In some states all matters pertaining to safety regulations of steam power or electric generating plants are under the industrial commission or safety board, while in others the public utilities commission has entire charge of all utility operation. The report suggests that ordinarily all of this supervision might well be under the direction of a state safety board, so that the protection against the common dangers may be everywhere the same, as in the case of boilers, pulleys, shaftings, etc., whether found in utility plants or elsewhere.

Round Table Conference on the Electric Railway Problem

Commissioners Recognize the Necessity for Increased Rates and Question the Ultimate Satisfaction of Service-at-Cost Franchises

THE afternoon session on Nov. 10 was devoted largely to a round table discussion of the electric railway problem and service by public utilities, the former subject occupying most of the afternoon. E. I. Lewis, chairman of the Indiana commission, presided.

Prompted by the fact that Miss Mabel Boardman, one of the newly appointed commissioners for the District of Columbia, was present, Mr. Lewis stated that it was unusual at meetings of the National Association of Railroad & Utilities Commissioners to address an audience as "ladies and gentlemen," but that he took much pleasure in doing it on this occasion. This led him to call attention to the fact that the interests of women must be considered, since they travel on street cars the same as men, and from the fact that women are those most directly interested in gas and other utility products. In this connection he pointed out that attendance upon motion picture shows had become an important factor in street railway traffic. He also mentioned that the feminine factor doubtless would be making its influence felt in the near future in memberships of public utilities commissions.

Continuing, Mr. Lewis pointed out that in the administration of electric railway affairs it is quite evident that the problem in one locality differs materially from that in another locality and that it is not fair to use a solution in one place and call it at all applicable to another situation. In Indiana, for instance, the commission found it advisable to give a 6-cent fare in Evansville, but a different situation caused 7 cents in Fort Wayne, and then in Indianapolis it has been possible to maintain a 5-cent fare. This latter rate in Indianapolis was due to several reasons, namely, that it was possible to find a very conservative value for the property and it was possible to reduce security issues against the property, but perhaps more than anything this was on account of the fact that

Indianapolis is out of the strip of high wages, which runs all the way from Boston through Buffalo, Cleveland, Toledo and especially Chicago. In other words, Indianapolis is a community with its individual solution. It is also interesting to note in Indianapolis that the company feels that it should maintain 5 cents if possible, for short haul passengers, and the commissioners are in favor of that policy. While recognizing the necessity for increases to 6 cents, 7 cents, etc., the commissioners also believe that a change to 6 cents encourages a later change to 7 cents, then to 8 cents and then to 10 cents, which they wish to avoid.

He said that last April the city of Indianapolis realized the railway needed credit and funds and petitioned for a service-at-cost franchise plan instead of the rate granted by the commission for relief. Nothing was done at that time except that a study was made, and last week the city of Indianapolis filed a petition withdrawing the service-at-cost franchise petition of last April. Fundamentally, the reason was that after a study of the situation the commission was unable to find any incentive for efficiency of private operation under service-at-cost provisions.

Mr. Lewis then opened the meeting to general discussion, calling specifically upon Edward Flad of Missouri. Mr. Flad said that the policy of the Missouri commission was to endeavor to give sufficient income to pay operating and necessary capital expenses and give additional return upon the investment. The commission, in its procedure, had tried to arrive at tentative temporary valuations, and so far its experience has been that the figures used were about half the capitalization of the companies investigated.

In connection with capital and rates of fare, Mr. Flad said that the general public believes that it has been exploited by the electric railways in the past, but that on the contrary the facts as he saw them were that it was the investing public which had been exploited and the riding public had had full value or more than full value for the fares it had paid. It is now the duty of commissions to protect investors. In the past traction magnates speculated and fleeced investors, but they were both merely playing the game and the former won. Commission regulation has taken away speculation and should guarantee a return on legitimate investment.

The Missouri commission has authorized 8-cent fares in St. Louis and Kansas City, but really believes in the zone fare in principle, with 5 cents as a base. Mr. Flad said he recognized the objections, but thought this to be the rational solution. The Missouri commission refused, however, to assume the rights of management and hesitates to put a zone scheme into effect against the will of a company, in the belief that the company and the public should agree upon a fare scheme. In St. Louis neither the public nor company wished the zone system, so the commission authorized a flat fare, which seemed to be desired.

Commissioner Henry A. Trumbower of Wisconsin said he thought the decision on rates was a two-part problem. The first part is simple, although it might involve a good deal of work, this being to determine what the total revenue of the company should be. The second part, how to arrive at methods to secure this revenue, is where the difficulty comes in. Theoretically, he would like to treat the electric railways the same as electrical power companies, telephone companies and gas companies and make a constant readiness-to-serve charge plus a charge for service rendered, and place this readiness-to-serve charge on automobile users and others who use the railways in bad weather and other emergencies, but don't take advantage of its service and thereby give the constant support the rest of the year. The wholesale ticket rate takes care of this to only a very minor degree, but monthly tickets might help.

In answer to a question from the floor as to what experience various commissioners had had in the change in traffic as a function of a change of fare, several commissioners offered their experience. Chairman Carl D. Jackson of the Wisconsin commission gave an analysis, which was seconded by many others, that fare increases first came in the fall of 1918, but the "flu" immediately decreased riding; that in January, 1919, when the soldiers started to come back, traffic came back and even increased, and that since then, so far as he was able to determine, if there had been any variation of traffic from what would normally be expected with a continuation of the 5-cent fare, it had been very slight. As a matter of fact, traffic in Wisconsin was larger under the increased fares than it was before.

Walter A. Shaw of Illinois gave data on Joliet and Elgin in which he indicated that the first increase in fare caused a slight decrease in traffic, but that this was regained and that subsequent increases in fare apparently caused no change in traffic. In answer to a question on the effect of tickets, he pointed out that in Springfield, a non-industrial community, the fare had been raised from 5 cents to 7 cents, four tickets for a quarter, and 65 per cent of the people used tickets, but that in Rockford, an industrial community, where the same fare change had been made, only 40 per cent used tickets.

Chairman W. D. B. Ainey of the Pennsylvania commission argued that the commissioners should not get off into bypaths of details but should come to the fundamental problem of trying to fix their responsibility and to have it understood by both companies and public. He said many companies are trying to throw the responsibility for the present condition of railways on the commissions, whereas many of the elements in the present railway situation were certainly beyond the control of any commission. Personally he did not want to throw anything else on the shoulders of the Pennsylvania commission.

He made the point that it is impossible to make any formulation of what might be called the electric railway problem; it is a combination of various circumstances stressed with different emphasis in different places. The commission has in any case the problems to consider of the managerial situation, corporate history, psychology of the community and the various obligations, some of which may be very old and utterly untenable. He quoted one contract which called for the railway to pave from curb to curb, which would take 90 per cent of the gross income of the company to pay. He pointed out that commission regulation could do nothing here and urged that the commissioners show the railways that there are many problems which are not regulation problems. He further emphasized the point made by Mr. Lewis that solutions differ in many places and emphasized that what pertains in Philadelphia cannot pertain in Pittsburgh.

As a basis for judgment, he argued the commissioners should not get the gross number of riders or gross revenue or the net return, but they should determine the number of car rides per inhabitant per year.

Then, even with this as a standard, he showed how difficult it was to make a solution as to fare change which might apply to the 150 rides per inhabitant per year in Pittsburgh be of any use to the solution of the Philadelphia problem, where formerly 288 rides per capita per year, now increased to 468 rides per capita per year, were found to be the facts.

Principally, Mr. Ainey emphasized that only as railway managers meet the problems themselves can they succeed. Upon question from Mr. Lewis as to his opinion of service at cost, Mr. Ainey pointed out that in Pennsylvania the commission felt that the organic law of the commission empowered it to administer the utilities under its jurisdiction on what is fundamentally a service-at-cost basis. He said he feels that they have every good feature of the service-at-cost principle and are free from some of the objectionable features. For instance, service-at-cost franchises cannot cure labor troubles and, more important, service-at-cost franchises do bring street railway operating problems so close to political control as to hinder proper operation and the maintenance of proper public relations.

One of the Ohio commissioners pointed out that his commission had no trouble with street railways, for, he said, "in 1911, when our law was passed, the street railways were able to write into the law a sentence which excepted them from jurisdiction by the commission where all their trackage was within the corporate limits of the city. During the last three years they wished they had not done this, but we are now glad we don't have to deal with their troubles."

William M. Smith, chairman of the Michigan commission, said that that commission had jurisdiction over the railways only by agreement between railway and city and that they had only three medium sized communities under their jurisdiction on this basis. He said that Detroit was not under their jurisdiction, but, being asked about the Detroit situation, he said that Detroit has had an electric railway problem for forty years and further that he thought the politicians would like to have this problem continue for another forty years in order to continue to make political capital.

One of the Georgia commissioners urged that utilities be encouraged to put all their cards on the table and drew a contrast between a five-day hearing which was a continual fight between lawyers and representatives of the municipality and railway and a one-day hearing on a much larger property where there was cordial co-operation, with sentences such as "Here, Bill, see this exhibit," and "Come over to my office and I'll show you all we have." From Georgia experience, he inferred that the public accepts a change of rate if shown that it is right and that the railway will continue to furnish the service which is more important to the community than the rate.

Mr. Lewis said in closing that there is no real analysis in fares versus traffic, and when the "flu" was considered, the increased riding due to returning soldiers was considered and when, subsequent to that, money took on an entirely different value, it was not fair to oneself to try to make a judgment upon reasons for any changes in traffic subsequent to changes in fare.

Mr. Lewis called attention to the slogan of "let the people rule" with the resultant primary laws, now somewhat discredited; he mentioned the "cost-plus" slogan of the war contracts, now entirely discredited, and he believed the "service-at-cost" slogan would be found two years hence not to have many of the advantageous elements now claimed for it.

As commissioners, he urged the gathering to carry away the recommendation that laws be so enacted and construed that commissions themselves could really regulate upon the good principles of the service-at-cost basis with the benefits of regulated private operation without the difficulties of local contact. Service-at-cost allows a railway to "pass the buck" on high charges. For instance, said Mr. Lewis, "why should a railway manager make any particular effort to buy $4 coal when a half dozen coal dealers are in his office wanting to sell it to him for $5 or $6 and he knows that the service-at-cost franchise provisions will allow him to collect whatever he spends." Don't allow the railways to get away from keeping the responsibility for good, clean operation under private management.

Mr. Lewis called attention to the terrible situation in New York and Chicago, which were shining examples of electric railways in politics. He said that every one knows that if a 5-cent fare was just before the war, it will not pay since the war, and no politician can ever operate a railway at less than cost.

Public Relations Round Table Discussion

Public Is Unreasonable and Should Be Treated on that Basis—Courtesy Called Cheapest and Most Valuable Commodity—Commissioners Call on Bankers to Appear and Save Country from Socialism

AT THE afternoon session on Thursday the most absorbing topic of the round table discussion was that of public relations. Upon invitation of the convention M. H. Aylesworth, secretary National Electric Light Association, told the assembled commissioners of the publicity work of the association on its own part and its co-operation with other public utilities in establishing bureaus or committees of public information in each of the various states of the Union. He also outlined the plans of the National Electric Light Association to start a campaign of service information by means of inclosures with electric light bills each month. He estimated that the first month would see 2,000,000 consumers receiving the identical literature and expected 4,000,000 to receive it within a few months.

The most interesting talk of the afternoon was given by Judge Clyde M. Reed of the Court of Industrial Relations of the State of Kansas. Judge Reed said that his own business was the newspaper business, he being the owner of one of the largest newspaper properties in southeastern Kansas, and as he had tried since his appointment to the court to analyze the public utility business, the principal question which arose in his mind had been whether the present unpopularity of public utilities as a whole was inherent to the public utility business or was due to the way in which the business has been conducted. He pointed out that public utility commissions themselves are in disrepute today because public utilities are not understood by the public nor does the public understand its relations to the public utilities. The commissions are commencing to be placed in the same class as the public utilities.

In discussing the relation of the public utility to the public, Judge Reed pointed out at what low cost the public was actually getting public utility service.

Excepting, possibly, the 2-cent stamp on a first-class letter, Judge Reed said that the cheapest thing which could be purchased or had ever been purchased in the way of service was a street car ride for 5 cents. And yet the public has never had brought to it a realization of how great this service was. He said that, in discussing this question with leading electric railway men, namely, how cheap electric railway riding really was, the electric railway men told him that the street car business has been built on cheap labor, but that, on the other hand, the public had demanded cheap service—in other words, it had demanded a service which could be given for 5 cents. This was possible only by means of cheap labor and it satisfied the public. The important point today, in the eyes of Judge Reed, is to educate the public to the value of service, but when the public is educated to the value of service, it is up to the public utilities to furnish this service. There must be a co-ordinated campaign in the offices of the public utilities with a campaign of courtesy and good service throughout the rank and file of the utility.

Judge Reed said that he thought the newspaper business was more nearly equivalent to the public utility business than any kind of private business because it dealt directly and in a personal way with more people than any other business except public utility. Judge Reed said if he ran his newspaper like most public utilities run their business, he would have been "broke" long ago. He prided himself on having the best newspaper in his town on account of the best service, and likened the complaints received when the daily newspaper failed to be delivered by his carrier to the same sort of human nature complaint given in connection with various features of public utility service. He also pointed out that the newspaper carrier boy with whom he had to deal in rendering his ultimate service and upon whom he had to depend for his service was likely to be of as irresponsible a nature as any character of employee of a public utility.

Judge Reed said that there is another point which seems to be entirely overlooked by public utilities. This is that on the whole the public is unreasonable rather than reasonable, "but," said Judge Reed, "I deal with the public on the basis that it is unreasonable." To make his point clear, Judge Reed said that the public utilities assume that the public has as much information as the public utility has itself, and usually the local manager of a public utility operates on this same basis. This, he says, is not the fact, and since it is not so the public exercises its normal human nature and takes out its various ill feelings on the public utility.

To meet this characteristic unreasonableness on the part of the public, the public utility must exercise a courtesy and a forbearance, and at the same time educate the public in enough of the facts of the public utility business that it can have something of an understanding of the problems. He made the point that "courtesy is the cheapest and most valuable commodity in the world." He thought utilities should supplement courtesy by education of employees in their conduct with the public and with an appreciation of the fact that the public is unreasonable. There is a mass mood of the public, and it is absolutely necessary that the public utility gets this mass psychology.

Judge Reed's remarks were received with great appreciation by the other commissioners, and Commissioner E. I. Lewis of Indiana, who followed Judge Reed, said that the trouble was that public psychology is not included in the curriculum of the education of utility personnel.

Mr. Lewis called attention to one public utility in his state which, he said, gives the best service of any public utility of its kind or size, but it was absolutely "in bad" with the public because it had no conception of its duty in connection with public relations. He analyzed public relations as being based upon two foundations: (1) Service, and (2) a full understanding of the utility by the public. He said he was interested in the program outlined by Mr. Aylesworth and hoped that it would accomplish two things: First, that the public understand what service is, and, second, that the public understand that public utilities are not under the stain of control by Wall Street. It is necessary that the public understand the relation of the financing of public utilities through the large investing institutions, such as banks, insurance companies, and last, but not least, the large number of small security holders all over the country. He agreed with Judge Reed that in all states there is a reaction to public service commissions on account of the reaction against public utilities in general.

Commissioner W. C. Bliss of Rhode Island urged that the bankers should appear before public service commissions to present the interests of the community in the investment of public utility property. He pointed out that much of the investment had been made, and that many investors had placed their money in public utility securities, at the behest of or following the advice of bankers. It now rests upon those who advised these people to invest their money to stand up publicly and say to how great an extent the interests of the whole community depend upon the continued prosperity of public utilities.

Public utilities have a bad standing at present due to past history, which of course should not enter now, but which can hardly be eliminated on account of human nature where every one, from childhood up, has been told of the manipulation in public utility financing. The public utilities have tried to tell their story, but the public doesn't want to hear. The public service commission cannot do it all on its own initiative, but the banker who has the respect and confidence of the public can stand up and tell the public a few things.

Mr. Bliss said that this is absolutely the only thing which stands between the American people and absolute socialism. If private institutions cannot continue a public utility, it means the beginning of breaking down of the American institutions, the next move being government ownership of public utilities, and this would only be followed by other steps resulting in absolute socialism. It is most important now to hold up the public service commissions which have followed the public utilities into disfavor. College presidents, local bankers, and men of similar respect and confidence in the community must appear before the commissions on their own initiative to save the situation. Mr. Bliss said he did not mean by this the large banking institutions in the metropolitan centers, but the local bankers in the individual communities who knew the local situation first hand and could present the facts in such light as to be understood by their neighbors.

[The foregoing report of the convention of the National Association of Railroad & Utility Commissioners does not attempt to cover the entire proceedings, but to present the story of the convention in so far as it pertains to electric railways. As the convention was not closed at press time further reports will appear in later issues.—EDS.]

N. Lawson, Arthur Power-Saving Recorder Company, might be expected to be found in the company of H. B. Flowers, general manager, and L. H. Palmer, assistant to the president, United Railways & Electric Company, Baltimore.

There's real action in the cane carried by A. Gaboury, superintendent Montreal Tramways, whose keen interest has won him re-election to the executive committee of the T. & T. Association. H. R. Mallison accompanies him.

Here is T. A. Ferneding of Dayton, Ohio, demonstrating his versatility by the way he holds his cane. With him are H. C. DeCamp, Westinghouse Electric & Manufacturing Company, and in the center, W. A. Keyes, Dayton Street Railway.

Boardwalk Glimpses of the Recent Atlantic City Convention

Genial, democratic, far-seeing—a guiding genius whose abilities have served so well the A. E. R. A.—this is John H. Pardee. In his company is S. W Trawick of the General Electric Company.

It must have been something good that John Stanley was putting into the near ear of W. Caryl Ely, vice-president Barron G. Collier, Inc., while the latter was trying to prevent it from escaping from the far one.

These two interurban general managers, H. A. Nicholl of Anderson, Ind., and F. W. Coen of Cleveland, are making headway (here toward the pier), which is characteristic of them during the rest of the year.

Three good fellows from the land of corn pone and 'lasses, Mardi Gras and lassies—L. C. Datz of Birmingham, J. R. McGivney and W. H. Renaud, Jr., of the New Orleans Railway & Light Company.

W. P. Butler, Johnson Fare Box Company, had a cane too, but ventured forth without it to lean on his comrades, T. A. Cross of Baltimore, J. N. Shannahan of Hampton and C. C. Castle of New York.

Here are, respectively, the progenitor, promoter and worthy ally of the safety car—C. O. Birney, Stone & Webster; C. H. Beck, Westinghouse Traction Brake Company; E. H. Ginn, General Electic Company.

Photos by Atlantic Photo Service

Relative Advantages of Modern Steam and Electric Locomotives*

A Railroad Man's Analysis of Statements Made in Papers Presented by A. H. Armstrong and J. E. Muhlfeld Before Joint A. S. M. E. and A. I. E. E. Meeting in New York on Oct. 22

By A. W. GIBBS
Chief Mechanical Engineer Pennsylvania System, Philadelphia, Pa.

A NOTABLE gathering of mechanical and electrical engineers interested in railroading was held in New York City on Oct. 22, under the joint auspices of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, to hear discussed the relative merits of the steam and the electric locomotive in modern heavy traction work. The principal papers presented, respectively by John E. Muhlfeld (steam) and F. H. Shepard and A. H. Armstrong (electric), were abstracted in the issue of this paper for Oct. 23, page 866. The discussion was largely covered in the issue for Oct. 30, page 923, and in that for Nov. 6, page 970, the closing remarks of George Gibbs were printed. A. W. Gibbs requested that the report of his remarks be withheld pending an amplification that he desired to make. This is now complete and we are able to publish a summary this week. As this paper gives the point of view of a railroad man who has had much experience with electric locomotives, it will be of value both to steam and electrical locomotive enthusiasts.—EDS.

THE papers by John E. Muhlfeld and A. H. Armstrong indicate that both of the writers have been a bit too enthusiastic. Both steam and electric methods of operating have their advantages and both have decided limitations.

COMMENT ON MR. ARMSTRONG'S PAPER

Mr. Armstrong's data are largely derived from mountain electrifications, where the electric locomotive is undoubtedly at its best and the steam at its worst, and he has compared with the electric a type of steam locomotive whose coal and water rates are more than double those of locomotives especially designed for such service. Then on the basis of this mountain performance he reasons from the particular to the general application of electric motive power. It is not at all certain that the speed advantage claimed is obtained where the steam locomotive is designed for the work.

Mr. Armstrong gives a comparative statement of the performance of two steam and one electric locomotive. (See ELECTRIC RAILWAY JOURNAL, Oct. 23, page 872.) To this exception can be taken because the steam locomotives do not represent the last word as to those available and the electric locomotive is on paper.

The accompanying table gives data for a 2-10-0 type steam locomotive, of which more than 100 are in regular service and of which fortunately very full information is available from the locomotive testing plant. These locomotives were expressly designed to do all of their work within the economical range of steam distribution, the required power being obtained by increases in size of cylinders and steam pressure. While I have given the power at nearly the speed mentioned by Mr. Armstrong, the performance is excellent at double the speeds given, but the sacrifice in drawbar pull—from nearly 60,000 lb. at 14.7 m.p.h. to about 43,000 lb. at 25.3 m.p.h.—would not be justified. The figures given are within the range where stoker firing is as economical as expert hand firing. The additional advantage of the stoker is that it does not get tired.

The Mallet performance given in Mr. Armstrong's paper is evidently that of one of the large compound locomotives. In all of these locomotives there is a tendency to choke up with increases of speed, due to increase of back pressure.

DATA FOR 2-10-0 TYPE STEAM LOCOMOTIVE

Weight in working order, lb	371,000
Weight on drivers, lb	342,050
Weight on engine and tender, lb	523,000
Drawbar effort at 14.7 m.p.h., 45 per cent cut-off, lb	58,900
Gross tons (2 per cent grade)	1,280
Trailing tons	1,019
Coal per developed horsepower at this speed and cut-off, lb	2.8
Tractive effort at 22 m.p.h., 40 per cent cut-off, lb	43,500
Gross tons	923
Trailing tons	662
Coal per d.hp., lb	3.2
Tractive effort at 25.4 m.p.h., 45 per cent cut-off, lb	43,600
Gross tons	948
Trailing tons	687
Coal per d.hp	3.8

The same arrangement of limited maximum cut-off used in the 2-10-0 locomotive already described has been embodied in a simple Mallet now running. This locomotive has the same speed elasticity as the 2-10-0 type. Unfortunately, this Mallet, which has a tractive power of about 130,000 lb., cannot be tried out on our present locomotive testing plant. Its drawbar pull is also above the capacity of our dynamometer car, so that no definite figures can be quoted until new recording springs have been applied and the machine calibrated.

In brief, the improvements in the steam locomotive, if properly availed of, have much narrowed the field of economical electrification.

SOME SALIENT TOPICS TAKEN UP BY MR. ARMSTRONG

Stand-by Losses.—While stand-by losses are actual and large it is very difficult to fix their value, as they are so much affected by the use made of the locomotive. Where the average monthly mileage is low the stand-by loss is presumably high, and it is a part of good operation to have the average mileage as high as possible. When all is said the electric locomotive has still an advantage with respect to stand-by losses, provided there are sufficient trains in motion to smooth out the total demand on the power plant, which is assumed to be steam-operated.

Weather.—The independence of the electric locomotive of severe weather is another undoubted advantage, not so much because of the performance of the motors but rather from the avoidance of losses and delays due to ashpit work and to frozen pipes and other parts, incidental to the presence of water on the steam locomotive. Where cold weather is a "steady winter diet," this is usually better handled than where cold spells are spasmodic.

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*Abstract of remarks made at joint meeting of railroad section A.S.M.E., metropolitan section A.S.M.E. and New York section A.I.E.E., held in New York City, Oct. 22, 1920.

Liability to Interruption.—Electric operation is dependent on uninterrupted connection with the source of power. In the event of breakage of the line, especially of the overhead construction, the trains in the section involved are dead and cannot get themselves out of the way of the repair trains. On large systems it is customary to make great changes in the assignment of locomotives to clear up congestion at any point on the system, also to avail of diversion routes on which steam trains may be moved around obstructions on the main line. The fact that the steam locomotive is a self-contained power plant is an immense advantage in this respect. In electric operation there is not this freedom of movement.

Speeds.—The question of speed is evidently treated from the freight standpoint, for there has never been any question as to the speed capacity of well-designed passenger locomotives. This is far beyond that permitted by the rules. In this connection it may be said that many of the electric locomotives could be very much improved by closer adherence to steam standards as to distribution of weights and in the adoption of wheel arrangements which will not set up resonant disturbances at high speeds.

While Mr. Armstrong treats the question of speed from the meeting point of view, it is probable that electrification will have its greatest application on roads where the traffic is dense, probably on multiple-track roads. As I see it, the feature of high speed of trains is of less importance than uniformity of speeds of different trains. If tonnage trains had the same speed as preference trains, and could thus avoid the great delay due to sidetracking of trains of inferior rights, far more would be accomplished than the mere saving in time over the division due to the increased speed. With steam trains at 25 m.p.h. water may be picked up from track troughs. Coaling stops will, however, still be necessary. Delays due to the train itself, such as those caused by hot boxes, burst hose, broken coupler knuckles, etc., would occur equally with steam or electric operation.

I fully agree with Mr. Armstrong that the 1,000-ton-mile has absolutely no value as a method of comparison for different roads and it should not be used except possibly for comparing the same division at different periods. His Table VIII (see ELECTRIC RAILWAY JOURNAL, Oct. 23, page 873) contains a fixed tractive coefficient which may or may not be obtained. The only comparison which has any value is the record of an accurate dynamometer car.

Cost of Maintenance.—Mr. Armstrong gives maintenance cost per mile for different electric locomotives. Any post-war data are so clouded by the abnormal labor and material costs as to be very doubtful. These locomotives have not run long enough to reach a general level of costs, as it will be noted that the average annual mileage is low except in the case of the Milwaukee locomotive. Besides this, there is no evidence as to the maintenance costs of the rest of the outfit, including power plant, transformers, transmission lines, converters or transformers, trolley or third rail, and track circuits, all of which are essential to the operation of electric locomotives, and are just as much a part of the electric locomotive as the boiler is of the steam locomotive. If power is purchased the purchase price, of course, includes the cost of maintenance of the power plant and of the transmission line to the point where the current is received on the road. If it is generated by the using company the cost of maintenance of the power plant should be included with the cost of maintenance of the locomotives. The renewals of parts of the power plant and transmission lines do not occur in the early stages of operation, but they are certain to come and when they do are heavy. From experience, I must deny that the back shop can be dispensed with with either class of locomotive, though it is admittedly more essential in the case of the steam locomotive.

Extent of Electrification.—Where electrification is contemplated a very serious question is: What shall be its extent? Naturally the desire would be to wipe out as many as possible of the extensive accessories to steam operation. If, however, it becomes necessary to operate steam trains over the electrified section, it will obviously be necessary to retain water stations and possibly fuel stations, provided the electrified section is sufficiently long. This operation of steam locomotives under their own power over electrified sections would be necessary in case of redistribution and possibly in case of diversions where the electrified section formed part of the diverted line. Therefore, the claim for economy in doing away with these features of steam operation would probably not be realized.

COMMENT ON MR. MUHLFELD'S PAPER

In my judgment Mr. Muhlfeld's enthusiasm has carried him too far in minimizing the advantages of electrification. The operation of the electrified roads has undoubtedly been good, whether it be terminal or road operation. The reduction in the number of engine terminals alone is a great advantage, to say nothing of the absence of fuel and water service with the stops that they entail, the way to get trains over the road being to keep them moving.

He also ignores the fact that the modern improvements which have so added to the performance of the steam locomotives are potential only. For instance, it is possible and common by indifference so to carry water in the boiler that the superheater becomes merely a steam drier and its value disappears. In many cases, because of neglect of damper mechanism or from dirty flues, little benefit is derived from improved appliances. Modernizing of steam locomotives calls for intelligent use of the devices, which will come when the old spirit of loyalty returns.

MR. GIBBS' CONCLUSIONS

The electric locomotive, or electric operation, has in many cases undoubted operating advantages because the power is generated in quantity at few sources and the power on any one train is not limited by the capacity of a self-contained portable power plant; sustained speeds are possible due to independence of fuel and water stations and, as a result of both these conditions, better use can be made of a given stretch of road.

Electrification does not at all obviate the numerous delays due to the train itself, such as hot boxes or other of the numerous derangements which when combined so much retard the movement over the road.

Electrification does not obviate that class of delay arising from necessary classification on line of the road to meet terminal requirements. Where the terminal conditions limit the capacity of the road as a whole electrification is not the remedy.

On level grade roads, where the existing steam locomotives will handle all the cars that can be safely moved in one train, the value of electrification will be principally the absence of stops and probable reduction in overtime.

The claims for fuel saving have been greatly overstated because the comparisons which are made are not with the potential performances of the best steam locomotives.

Of course, with steam locomotives the maintenance or the indifference of those operating them, both on the road and elsewhere, may to a large extent nullify the savings possible.

Stand-by losses must exist probably with both classes of operation, but especially with steam, and may be any percentage of the total consumption, depending on the actual use of the locomotives.

The relative cost of repairs of both classes of equipment cannot be fairly stated at the present time because maintenance conditions are so abnormal and because the most modern locomotives of both classes are too new to have reached a stable condition, this being especially true of the electric one. While the indications are that the maintenance of the electric locomotive will be less than that of the steam, it must be remembered that the electric locomotives are dead affairs without the necessary electric generating, transmitting, converting and track appliances, all of which are an added expense, due solely to electrification; hence the cost of maintenance of all of these, in addition to that of all of the locomotives, divided by the locomotive mileage, is the real treasury cost of maintenance per locomotive-mile.

If the operating current is purchased, obviously the cost of maintenance of generating apparatus and of all appliances to point of delivery of current is covered in the rate, but in any event it is ultimately paid in some form by the user.

Personally, I believe that many roads now operated by steam will be operated in whole or in part electrically, but that this will not be decided in the offhand manner advocated by some.

It is to be noted that practically all of the electrifications on steam railroads so far have been based on local conditions. In the electrifications in and around cities a moving cause has been the elimination of smoke and other objectionable features incidental to steam operation and the possibility of increasing the capacities of the passenger terminals. On the Milwaukee road it was the utilization of available water power. On the Norfolk & Western it was to secure increase in capacity on a congested mountain division with tunnel complications. It is fair to assume that other electrifications will be similarly governed by local conditions.

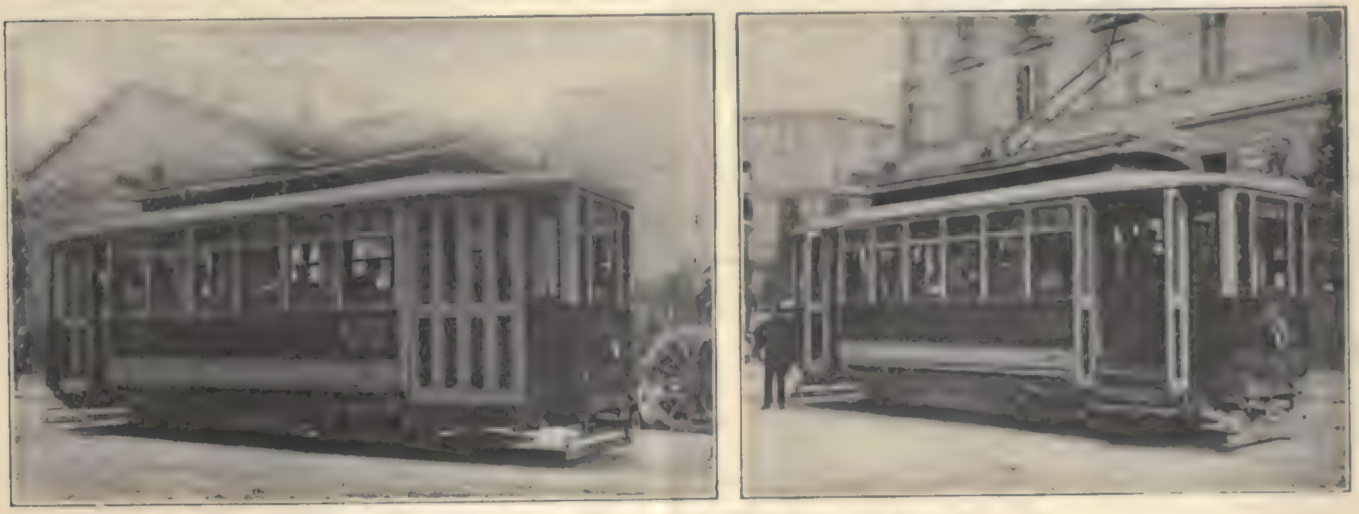
Question Largely One of Economics

If, after careful consideration of the road, based on actual train sheets for the heaviest actual or probable congested operation, the capacity and number of active and available locomotives required, crediting the operation with incidental savings which may be effected, and eliminating expenses peculiar to steam operation, it appears that there would be economy in electrification, either from actual savings or better operation, or both, it still remains for the management to decide whether the money required can be spent to better advantage for electrification than for some other features of the general operation.

In this connection it must be remembered that on originating roads a considerable part of the locomotives' assignment is devoted to service on the branches feeding the main line and forming part of it, and that in this service they make little mileage. If these branches are electrified, their operation will be a decided drag on the economies of the main electrification, for the reason that each of the steam locomotives will have to be replaced by an electric one, with its greatly increased first cost with small use to justify. If they are not electrified and the operation of the district is part steam and part electric, locomotive terminals, organizations and all that go to make up steam operation must be retained to an extent.

Prepayment Cars in Rome

FROM a report received from F. Cusani of Milan, Italy, it appears that the prepayment plan of fare collection has met with approval in Rome. Mr. Cusani has sent the accompanying pictures of a short, double-end prepayment car as used in the "Eternal City."



FRONT AND REAR OF PREPAYMENT CAR USED IN ROME, ITALY

ELECTRIC RAILWAY PUBLICITY

Devoted to How to Tell the Story

Movies in the Electric Railway Industry

MOVIES as a means for effectively disseminating railway publicity have been extensively discussed in recent issues of this paper. The appended contributions give further evidence of the continued interest which this subject holds in the industry.

News Features Good Subjects for Film Publicity

AMERICAN RAILWAYS COMPANY
PHILADELPHIA, Nov. 3, 1920.

To the Editors:

It seems to me that there are three means of publicity open to the electric railways today. First—The spoken word, the scope of which is limited, but nevertheless I believe that in every company there should be at least one man who is sufficiently well informed on the public utilities situation in general and the case of his own company in particular to appear before public meetings or gatherings, such as Rotary Club, Kiwanis Club, Chamber of Commerce, etc., to present—preferably not in an oratorical fashion, but clearly and succinctly—the facts as they exist. And it would be particularly advantageous if there could be connected with the company some organization of employees which would meet at least annually, at a picnic or dinner, before which could appear some official of the company in whom they would have confidence, and talk along these lines. There is nothing new or novel in this proposition.

Second—The printed word. This has been the most usual method through newspaper advertising, dissemination of news such as was prepared by the Committee of One Hundred, company publications and advertising in the company's own cars. This, if properly and skillfully done, is a very effective means. I know from personal experience that the matter is read and, if well done, is looked for, the public being curious as to what the company says next.

Third—The suggestion that the public be approached through the medium of the motion pictures. This, of course, would be very effective. It has been used with marked success in accident prevention campaigns. As to how it could be issued in connection with our general situation, I am inclined to agree with the communication published in your issue of Oct. 23 "From the Middle West Railway." I doubt very much that a scenario could be prepared which would give a true picture of our situation and for which the public would stand.

I do believe, however, that through the medium of one or more of the so-called news features or topics of the day flashes could be given which would take up from time to time certain features of the situation and present them to the public in a fashion which would be very helpful. It would, of course, require the assistance and co-operation of men skilled in this art and could be done only through the medium of a national organization, such as the Committee of One Hundred, as the expense would be such that it could not be done by an individual company. This medium, of course, would give the widest range to the presentation of the situation, and it would reach the young people and children along certain lines who would not be reached through either the first or second methods. It would also reach an element of the adult population who probably would not read the publicity matter in the paper and who certainly would not attend meetings at which it was discussed. The suggestion is worthy of careful consideration.

C. L. S. TINGLEY, Second Vice-President.

Rhymes of the Underground

The story has been told to you
Of good Adolphus Minns of Kew,
Whose virtuous ways have won renown
From Barking Creek to Acton Town.
Now with that hero's blameless life
Contrast the conduct of his wife:
Avoidance of egregious sins
Is not the way of Mrs. Minns.
That lady, I regret to say,
While bent on shopping every day,
Makes no attempt to get it o'er
Between the hours of ten and four.
To harassed booking-office clerks
She makes irrelevant remarks,
And tenders, to the crowd's despair,
A pound note for a penny fare,
Or, what perhaps is even worse,
Starts fumbling in a baggy purse.
She'll step aboard a Highgate train,
Then check and double back again,
And ask a dislocated queue
If she is right for Waterloo.
The liftmen, who, you recollect,
Spoke of Adolphus with respect,
Are pessimistic, even for them,
About the fate of Mrs. M.
Where Gertrude Minns will go when she
Departs this life is not for me,
Or you, or liftmen, to decree.
And, anyway, we needn't fret,
She shows no sign of dying yet.

From *Punch*, London.

To Public's Own Interest to Know About Their Utilities

BRITISH COLUMBIA ELECTRIC RAILWAYS, LTD.
VANCOUVER, B. C., Oct. 22, 1920.

To the Editors:

The next step in publicity work seems to me to be the training of thousands of more publicity persons among the employees and the public of each territory. The age when a company should have to force its propaganda upon the people when such education is in their own interests is passed and the time has come, in my opinion, when the public generally should be active as well as passive supporters of the public utility. In other words, the necessity for supporting the public utility should be "sold" to the public. Of course when you analyze this it simply comes down to the same kind of publicity as we all have been conducting, but perhaps it may remove some of the apologetic or defensive attitude the company may assume. Circumstances alter cases, of course, and in some territories it may not be possible to put the welfare of the public utilities up to the public from a purely self-interest point of view, and, again, some territories are handicapped by having a sort of vested antagonism against utilities. Then, again, in some places people are apathetic and take little interest in public utilities one way or another. I know our own territory alone in an intimate way, and it has been a problem to arouse people at times from their apathy. On the other hand, this apathy may be of advantage in deadening criticism which otherwise might occur.

Speaking of this district specifically, we expect that a wave of prosperity and development which is passing over us will take the public utilities out of the hands of a lot of carping critics and make people in general feel more disposed toward invested capital. This will also aid us because we are now in a position of having the public coming to us for extensions to service, and these cannot be made so long as public utility credit is at a discount.

We are using this argument on every possible occasion to win over to active support those elements of our population which are eager for increased facilities and development. I believe that in the course of time we will achieve that end, and for that purpose we are using all possible avenues of publicity in laying each case before the men on the street, the business men and the newspapers. By steadily pointing out the fact of lack of development we are gradually convincing those in allied industries that they must support their public utilities. While only the fringe of this work is being touched upon, I have no doubt that with the spirit which is prevailing at the coast here people will soon realize it is much better to be constructive in support of public utilities than destructive in their criticism.

Publicity, of course, is only one small feature in the making of good public opinion and no company can afford to overlook the service it gives and the work of its employees. Some people are apt to think that all that is required is the formation of a publicity department, whereas I believe it is realized in most companies that every employee, not to mention every official, must be an active propagandist, especially because so many people look askance at any statements or material coming from a publicity man. If we are to expect that the public will actively take up the backing of their public utilities how much more should this be the case among the employees of these utilities?

I have said nothing about the actual mediums of publicity because these are too well known to need comment. I have merely suggested the tone in which I believe the next steps in publicity work should be taken.

J. LIGHTBODY,
Publicity Manager.

Economy in Track Construction to Be Demonstrated by Movie Film

BOSTON ELEVATED RAILWAY

BOSTON, Nov. 2, 1920.

To the Editors:

I am very much interested in the attention which the JOURNAL is giving to the subject of publicity. I quite agree that there are certain shining examples which may be pointed out where a thorough job has been done. I do not believe that the full benefit of the proper kind of publicity has as yet come to the electric railway industry.

It must be appreciated that local conditions determine the starting point for the particular publicity necessary. For instance, with us publicity, as it is commonly known, must of necessity be influenced by the fact that no longer is the property operated by a private company pleading for a square deal and the rights of the investing public, but it has come under the direct management of state-appointed officers, and this of itself influences the public because of the knowledge that the management has no other interests but that of the car riders under a service-at-cost act.

It is quite surprising how different certain phases of operation under these conditions are as compared to those existing previously under private operation. It is relatively simple, therefore, by the printed word to show specifically where money is expended for improvements, and why. It is likewise simple to convey the effect of large increases in wages resulting from arbitration, as well as extraordinary increases in price of coal, etc., and their effect on the service and the problem of meeting costs within the limits of possible fares.

But to my mind the surest road to proper publicity must come through what is commonly called "good will," which lies to a large extent within the power of the large body of employees of a street railway to create. As we leave the unsettled period of the war behind and efforts are exerted toward efficient and economical production, the increase in production, interest and pride in the work of the employees must be the rock-bottom foundation of future publicity.

Where the labor turnover is large the problem of reducing wastefulness of labor turnover is necessary. Where conditions have become so settled that the labor turnover is small the present body of employees must be brought to a full realization of their actions on the fortunes of the company with which they are associated. If no printed publicity was sent out from a company whose body of employees represented perfection in the matter of securing good will of patrons, an outsider would undoubtedly comment that that particular road must have a good publicity department. The contact that these employees have with the thousands, their spirit of service, knowledge of the facts of the business and apparent interest in performing their work in the interest of the car rider would itself be a most powerful agent of publicity.

Unless this foundation has been laid publicity pamphlets, cartoons, motion pictures and statements cannot bring full results, because they will be counteracted by a knowledge on the part of car riders that the great body of employees are not producing good will.

If I may draw an analogy befitting the football season of the year, I would say that the loyal band of rooters for a football team before the game, during the game and after the whistle has blown, even though their team may have been outclassed, is the right kind of publicity for their particular university, even without the facts regarding the relative ability, experience, weight or height of the individual players comprising their team.

I believe I have advised you that we are working up a motion picture showing the efficiency and economy in connection with the work of our maintenance department in laying track as compared with methods employed but a short time ago. With labor organized and conditions as they are, I cannot but emphasize what to my mind seems the big problem, namely, the creating of good will permanently by the great rank and file of street railway employees.

EDWARD DANA, General Manager.

Publicity for Safety's Sake

The following shows an envelope inclosure card used in the safety publicity work of the Beaver Valley Traction Company:

Stop, Look and Listen

You're enjoying good health
—That's pleasant

You want to remain so
—That's natural

You may be careless
—That's possible

You may have an accident
—That's probable

You need protection
—That's evident

Better start now
—That's wisdom

WAIT for the CAR TO STOP

Get off the car in a safe and graceful manner. Take hold with the left hand and face the front of the car.
—That's proper

Do This and Avoid Accident

Beaver Valley Traction Co.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Ohio Committee Busy

B. E. Ling Outlines New Organization's Aims in First Statement to Press—Utilities Need Aid

Benjamin E. Ling has entered actively upon his duties as director of the new Ohio Committee on Public Utility Information. His first news bulletin to the press was issued under date of Nov. 6. In a statement outlining the purpose of the committee it is pointed out that public utility concerns of Ohio seek to prevent their business from falling into the same financial plight out of which the steam railroads are now trying to extricate themselves.

FAIR TREATMENT ASKED

All that the Ohio utilities ask is "sane, scientific, non-political and just treatment" such as will enable them properly to perform the service imposed on them by their intimate relationship with the everyday life of each man, woman and child in the State and the communities in which they operate. The introductory statement of the committee follows in part:

> It will be the aim of this committee to put before the people of Ohio by every means possible the economic facts about the public utility industry as an industry. This means the small town light plant as well as the big city central power station; the village street car line as well as the large city street railway system; the independent telephone company as well as the Bell.
>
> The utility companies of Ohio believe that their customers have the right to know and indeed should know the facts regarding the business organizations which serve them with such present-day necessities as street car, electric light and power, telephone and gas service.
>
> ### UTILITIES ASK NOTHING BUT A SQUARE DEAL
>
> Without efficient utilities, cities and towns cannot prosper, and utilities are unable to be efficient without being prosperous. Thus the prosperity of each community is intimately bound up with the prosperity of its utilities. Utilities are subject to the closest supervision and regulation by the State, consequently they cannot make any undue or unreasonable profits, but they must be enabled to earn sufficient revenue to pay for the cost of service rendered and insure a fair wage for both capital and labor.
>
> It is the sincere belief of the utility companies that the public is fundamentally fair and just, and that a better understanding of the problems of the utilities will bring about a closer, more intimate, and more fully sympathetic relationship between the people who are their customers, and the management of the companies which serve them.
>
> The utilities ask nothing but fair play—just treatment to enable them to conduct their business in such a way that the public is assured adequate and proper service, that the employees get a decent living wage, and that the men who have invested their money in the industry receive a reasonable return on their investment.
>
> Just treatment is essential for the maintenance of good service and for the protection of investors. Unless the public utilities of Ohio prosper, there can be no permanent prosperity in the State. A utility rendering a service to a growing community cannot stand still; it must grow as the community grows or the community will stop growing. Stagnation means weakening of the utilities service and eventual death for both the utility and the community so far as prosperity is concerned.
>
> Undermining the credit of the utility companies so that it is difficult or impossible for them to obtain additional capital cannot fail to have serious and far-reaching ill effects upon general credit and business prosperity.
>
> Inferior service is a result of weakening the credit of a utility. Impairment of credit comes about through unwarranted attacks upon the service companies and insistence upon rates too low for companies to make a reasonable profit and give a proper service.

SOME PAPERS HOSTILE

A fact which is frequently overlooked is that Ohio is the only State in the Union with seven cities having a population of more than 100,000 each. These cities are Cleveland, Toledo, Akron, Columbus, Cincinnati, Youngstown and Dayton. In all of these cities except Youngstown and Dayton newspapers of the so-called Scripps syndicate are published. These papers are avowed advocates of municipal ownership. Moreover, they are a real power in moulding public opinion. The Scripps paper in Toledo, the *News-Bee*, has injected itself into the Toledo franchise fight on all occasions, but as noted in the ELECTRIC RAILWAY JOURNAL for Nov. 6 the vote in that city at the recent election was a severe rebuke to tactics employed by the *News-Bee*, the municipal ownership proposal having been rejected.

Free Rides in Petrograd

Free rides are now provided by the tram cars of Petrograd, the former charge of 2 or 3 rubles having recently been discontinued. H. G. Wells, the British novelist, who has just returned from Russia, says of the Petrograd tramways that they "are the last legacy of capitalist enterprise" remaining in the city. Mr. Wells, in describing life in the former Russian capital, in an article in the New York *Times* of Nov. 7, says:

> People hurry past in the thin traffic compared with my memories of 1914. Electric street cars are still running, and buses until 6 o'clock. They are the only means of locomotion for ordinary people remaining in town, the last legacy of capitalist enterprise. They became free while we were in St. Petersburg. Previously there had been a charge of 2 or 3 rubles, the hundredth part of the price of an egg.
>
> Freeing them made little difference in their extreme congestion. During homegoing hours every one scrambles on a tramcar. If there is no room inside you cluster outside. In the busy hours festoons of people hang outside by any handhold possible. They are frequently pushed off and accidents are numerous. We saw a crowd collected around a child cut in half by a tramcar and two people in the little circle in which we moved in St. Petersburg had broken their legs in tramcar accidents.
>
> The roads along which these tramcars run are in frightful condition. They have not been repaired for three or four years. They are full of holes, like shellholes, often two or three feet deep. Frost has eaten out great cavities. Drains have collapsed and the people have torn up the wood pavement for fires. Only once did we see any attempt to repair streets in St. Petersburg. In a side street some mysterious agency had collected a load of wood bricks and two barrels of tar.

Franchise Acceptance Soon

Toledo Grant Will Take Effect Following Property Transfer—Commissioner to Be Non-Resident

The active working of the new cost-of-service franchise for the electric railway system of Toledo, Ohio, is now awaiting the untangling of legal and technical difficulties encountered in transferring the property of the Toledo Railways & Light Company to the Community Traction Company, formed by the provisions of the ordinance. The company's lawyers are busy arranging the legal details incident to the transaction. The company has ninety days in which to file its formal acceptance of the franchise, at the time of which filing it will become effective.

An agreement was filed before the ordinance was submitted to the people by two companies—the Toledo Railways & Light Company and the Community Traction Company—in which they agreed to accept the ordinance if passed by the electors.

WILL NAME BOARD OF CONTROL

As soon as the franchise is formally accepted Mayor Schreiber will appoint a board of control of three members which will have full charge of street railway matters during the life of the grant. The members will serve for terms of six years each except the first two appointed, who will serve terms of two and four years respectively.

This board of control will have the naming of the street railway commissioner and the fixing of his salary as one of its first duties. It will make recommendations to the Mayor, who will actually make the appointment. It is thought that the Toledo commissioner will be a non-resident in order to eliminate difficulties in the initial operation of the franchise.

One of the first duties to be taken up by the board of control will be the rerouting and reconstruction of the Toledo system. These matters will be taken up with a view to more efficient operation and better service. The building of a cross-town line will also be one of the first things to be considered in the rebuilding of the system.

WILL SCRAP SOME LINES

The Toledo lines were acquired by different companies combining small properties operating single lines. In this way the present system acquired several parallel routes which will probably be eliminated. The only limitation placed on the board in its arrangement of the system will be that it shall not cost more than $1,000,000, nor impair the ability of the company to meet its obligations and earn its specified return on its investment. For all money brought into the system in the building of the cross-town line and rerouting of the present lines, preferred stock will be issued to the Doherty interests which will yield them 8 per cent, thus protecting the present investors in the Toledo properties.

When the franchise is placed in effect it will immediately reduce the car fares from 7 cents and 2 cents for transfers to 6 cents and 1 cent for transfers. This fare scale will be in effect for six months, when the stabilizing fund will determine the fare level for the next six months.

City Rejects Service at Cost

Indianapolis Authorities After Exhaustive Study Request Withdrawal of Flexible Fare Proposal—Railway Asks Transfer Charge

The city of Indianapolis, Ind., on Nov. 4, filed a petition with the Public Service Commission of Indiana, requesting the withdrawal of the proposal for service-at-cost operation of the Indianapolis Street Railway. Immediately following the action by the city, the company filed with the commission application for authority to charge 2 cents for each transfer. The company in its petition declares that the additional charge is necessary to provide funds for the enlargement and improvement of the system. Officials of the commission indicated that the case would be given an early hearing. The present fare in Indianapolis is 5 cents with no transfer charge. The city presented the service-at-cost proposal to the commission several months ago. The commission has taken no action on the original proposal, but it is predicted that the proposal will be discarded. When the proposal was placed before the commission, the city, the Indianapolis Street Railway and some of the commissioners favored the general plan. Since that time the plan has come into disfavor with its original sponsors.

WHEN the city proposed the service-at-cost plan to the commission the company raised the objection that if, under the proposal, an increase in fares resulted in reducing the company's rate of return on investment, the company's credit would be injured greatly, if not actually destroyed. Accordingly, E. I. Lewis, chairman of the commission; Samuel Ashby, corporation counsel; Henry Jameson, chairman of the board of directors of the company, and H. H. Hornbrook, attorney for the company, studied the proposal and investigated the operation of similar systems in Cleveland and Cincinnati.

OTHER SYSTEMS STUDIED

In regard to this investigation the new petition of the city said:

> We have been unable to find or agree upon any plan of operation on the basis of service at cost which would furnish the incentive of private ownership in an operation of service at cost, and the result of our investigations generally has been to raise a most serious question and doubt as to the wisdom of the service-at-cost plan. The inevitable tendency seems to be for the operator or company readily to accept increased cost of operation with the view that it can be passed on to the public by higher fares. Such a course results in only adding to the burden of the public.

The experience of Cincinnati was cited as an illustration of the operation of the plan. On this point the petition said:

> The fare was increased from 5 cents to 6 cents, and from 6 cents to 7 cents, and from 7 cents to 8 cents, and during the comparatively short time in which the plan has been in operation, the company has accumulated a very large operating deficit. During practically the same time the Indianapolis Street Railway has been operating under the emergency order of the commission at 5 cents. It has been able to operate without a loss, its revenues have been more than its operating expenses and sufficient to pay a reasonable return on the fair value of its investment. The increased fare reduces the number of passengers, and has a tendency to increase the cost of operation. The result is that the revenue received from carrying ten passengers at 5 cents is more than eight passengers at 6 cents, or seven passengers at 7 cents, or six passengers at 8 cents. This is a simple illustration, but shows the effect of the higher fare and decreased number of passengers on the revenues of the company.
>
> At the time the city made its suggestions as to the plan of operation, it was genally supposed that this method was the best solution of the street car question. We attempted to take the best out of the various plans in operation in Cleveland, Cincinnati, Boston, Montreal and Memphis. All of these plans had some features which did not meet our approval and the plan suggested by the city was submitted to the Public Service Commission for its consideration and to bring this plan to the attention of the public for criticism and suggestions.
>
> After repeated conferences with Mayor Jewett, the city has concluded, in view of our investigations since the plan of service at cost was thus submitted to the Public Service Commission for consideration, and the unsatisfactory results of operation of this plan in other cities since then, to withdraw the same from further consideration by the commission.

The 2-cent transfer charge is asked by the company to cover only the present emergency period. The petition states that the additional 2 cents for each passenger issued a transfer would increase the yearly revenue about $300,000.

TRANSFER CHARGE IMPERATIVE

For a short time the company was granted a 1-cent transfer charge by the Public Service Commission, the 1 cent being refunded to the passenger in case the transfer was used. This charge was intended primarily to eliminate the wasting of transfers and the only revenue coming to the company was from transfers which were issued but not used. This plan was abandoned after a short trial and had little effect so far as the company was concerned.

Alleging that present conditions are the result of the emergency created by the war, the company states that present fares and revenues "are and will continue to be inadequate and insufficient to maintain your petitioner in a solvent operating condition and to enable it to discharge its duties as a public common carrier of passengers." It is also declared that proper service cannot be maintained without financial relief.

The cost of maintenance of the system during 1918 was $2,417,407, or 67.6 per cent of the gross earnings, according to the petition. This cost for 1920 is placed at $4,087,577, or 75 per cent of the gross earnings. Taxes have increased from $319,675 in 1918 and $401,806 in 1919 to $540,072 in 1920.

ALL COSTS INCREASED

The cost of coal has increased for the company from $566,712 in 1918 to an estimated cost for coal and power in 1920 of $899,584. It is stated that the price of coal has increased from $2.97 a ton in 1918 to $5.20 a ton this year. These increased costs, the company says, have more than overcome all increases in gross earnings so that the net earnings have decreased from $1,078,936 in 1919 to $813,007 (estimated) for 1920.

The petition states that the value of the actual physical property used and useful in the public service has been fixed by the public officials of the State of Indiana and of Marion County, for the purpose of taxation, at $18,058,570, exclusive of any intangible values, which is the value upon which its taxes are being assessed and paid. The Public Service Commission has heretofore tentatively found the value of the company's property to be between $14,000,000 and $16,000,000. Even upon such smaller sums the present net income of the company will fail to produce a reasonable return, the company contends.

Baltimore Men Accept 2-Cent Increase

The employees of the United Railways & Electric Company, Baltimore, Md., have accepted a wage increase of 2 cents an hour in lieu of the 15-cent increase they had previously asked. A wage scale of 50 cents an hour was fixed in August, 1919, and since that date the men have received no increases in pay. The company has been operating at a 7-cent fare since October, 1919. This 7-cent fare was to continue during 1920. The matter of continuing this rate will come before the State Public Service Commission within the next month. The showing of the company has been good, but the 15-cent rise sought by the men would have left the company facing a large annual deficit. Meetings were held between the company officials and the employees at which the company was represented by President Emmons and General Manager Flowers, while the men's interests were looked after by Charles C. Kranz, president of the employees' association.

The men at first indicated that they would not accept an increase of less than 15 cents an hour. However, when the company's position was made clear to them they decided to take the 2-cent increase which was offered to them by the company.

Kansas Court in Action

Hearing of Interurban Employees' Case Illustrates Workings of New Industrial Tribunal—No Talk of Strike

A striking illustration of the workings of the Kansas Court of Industrial Relations is afforded by a case now pending before that body involving a controversy between the Joplin & Pittsburg Railway, Pittsburg, and its employees. The company and the men are seeking an interpretation by the court of portions of the present wage agreement. This agreement was drawn up last spring after hearings before the court, and granted the employees a substantial increase in pay. At no time during the negotiations has there been talk of a strike. The court, acting in its capacity as a mediator rather than as a tribunal in the stricter sense, has aided both parties in setting forth their views. The hearings on the case have been harmonious. The court has now been in existence about a year. Under the law appeal from its decisions can be taken to the State Supreme Court.

THERE were several elements of the contract on which the company and men could not agree. It is hardly accurate to express the situation as "controversial." Throughout the negotiations there was none of the bitter hostility previously shown in the discussions of contracts. The men presented their suggestions as to clauses wanted, and the company responded with the arguments against these suggestions; failing to reach agreements, the matters were automatically referred to the Court of Industrial Relations. Some of the cases of difference were mere matters of disparity as to amounts and extent, both parties agreeing as to principles. There were some matters minor in immediate effect which involved principles on which neither side was disposed to yield.

WORKING CONDITIONS INVOLVED

Five major subjects were submitted to the court at a preliminary hearing held on Oct. 20. These subjects are:

1. Minimum wage for extra men.
2. Number of men in freight crews.
3. Eight-hour or nine-hour shifts.
4. Pay for Sunday shop work.
5. Period for prevalence of order.

The attitude of the company and the men on these matters is as follows:

1. The principle of minimum pay for extra train men is not disputed; the court is asked by both men and company to fix this minimum. The company now has twenty-seven extra trainmen, who during the past three months have made an average of $100 a month. Regular trainmen have averaged, in the same period, $150 a month.

2. The men are asking that a minimum of three constitute a train crew when three or more freight cars constitute the "string" to be handled. They advance precedents for this practice. The company maintains that the superintendent should have authority to decide whether two or three or more men should do the work on any "string."

3. The men are asking eight-hour shifts in train service, and assert that it is possible to evolve a plan whereby the eight-hour day can be established without disturbing the company's operating program. No precedent is advanced on this subject by the men. The company maintains that passenger service is established on an eighteen-hour day basis, providing for two shifts of nine hours each; that such eighteen-hour service can be divided into two nine-hour shifts, but not into eight-hour shifts; and that the service cannot be reduced to sixteen hours a day, which would be required under eight-hour shifts. The company also maintains that establishment of eight-hour shifts would result in trainmen working an hour overtime on every shift, and that the only result of an eight-hour order would be an increase in the wages, which have already been fixed by the court.

4. The men are asking time and a half for Sunday work in the shops. Here, again, a principle is involved. The shopmen now take Sunday work in rotation, employees averaging Sunday work in shops every other Sunday. That this practice is not burdensome or disagreeable to the men is argued by the company in view of the fact that shopmen wanting to be off on the Sunday when their turns come have no difficulty finding substitutes.

The company takes the position that extra pay for Sunday work is admittedly and rightly a penalization, to compel employers to reduce Sunday work to a minimum, and to prevent an employer from profiting by Sunday production and extra labor of employees. In this case the company does not operate shops on Sunday for profit, but for public service. It points out that Sunday shop work, particularly the cleaning of cars, is a regular and emergency feature of interurban operation, an unavoidable incident of the business and of the job. An order providing for extra pay for Sunday work would merely be an increase of wages.

5. The men and the company disagree as to the period over which any order issued by the court shall prevail. When the court fixes these disputed matters the order takes the place of a contract; and the men wish to be assured that the conditions of the order shall govern for at least a year. They are understood to be suggesting a two- or a three-year period. The company suggests the advisability of limiting the prevalence of the order to a short period if any limitation is set. A year would be the maximum period satisfactory to the company, under present uncertain conditions.

The court is alleged to have gone on record regarding the principle of the eight-hour day for trainmen. Judge Huggins of the court remarked that in principle the eight-hour day is desirable; but that nine hours a day does not constitute a physical or mental strain detrimental to health in train service, and is not long enough to deprive an electric railway worker of his social privileges. He said he would favor an eight-hour day if it could be done without overburdening the company.

LABOR SITUATION REVIEWED

Aug. 1, 1920, was a notable day in the history of the railway. This date has customarily marked the beginning of the "annual" strike. One year the men were out thirty days, another ninety days, while negotiations for a new contract were proceeding; Aug. 1 has been the date on which the company's contract with the various unions terminated.

On Aug. 1 last the company and the men had already agreed upon practically all the terms of the new contract; a few items remained under negotiation, and these were automatically and as a matter of course referred to the Court of Industrial Relations, the men continuing at work while the subjects were being settled.

A few words concerning the negotiations between company and men this year, affecting the contract now being formed, will help to connect the various phases of the present situation. Early in the spring of 1920 the employees of the railway began their annual practice of wondering what was going to happen when the contract negotiations were entered into. Pittsburgh, the headquarters of the company, is a coal-mining town, and one of the most thoroughly unionized communities in the United States. There were more than 600 strikes of coal miners in the Kansas and Missouri fields in a period of twenty months during the war; strikes had become a normal and accepted incident of discussions between employees and employers in almost every industry. The city is also the headquarters of Alexander Howat, president of the coal miners' union in Kansas, and Howat is aggressively hostile to the Court of Industrial Relations. Agitation promoting labor unrest is therefore continuous in Pittsburgh.

INDUSTRIAL COURT INTERVENES

When the employees of the railway began to wonder about the probable events accompanying making of a new contract to go into effect on Aug. 1 the Court of Industrial Relations made a visit to Pittsburgh. It summoned the committees of the railway men's unions, officials of the company and employees not officially designated to represent the unions. Frank O'Shea, of the Amalgamated Association, also appeared before the court.

The court, following the hearing, issued an order, effective May 1, fixing the wages of trainmen and shopmen at an advance of 5 to 10 cents an hour and fixing higher maximum for certain other classes of workers. The company and the men accepted the order without complaint or appeal. In July the trackmen, substation operators and others whose wages had not been readjusted in the May 1 order were heard by the court, the circumstances being the same as at the first hearing. Their wages were the subject of an order effective Sept. 1, some increases being granted, some wages being left as before. Again the findings were received by both parties without question.

ELEMENTS OF CONTRACT

The two hearings and the consequent findings going into effect May 1 and Sept. 1 related only to wages. The second wage reference to the court, as above noted, occurred in July while the company and the men were discussing the new contract. The discussion proceeded in relation to other phases of the contract than wages, and, during September, nearly every element of the contract was agreed upon. In most cases the paragraphs were reaffirmations of the same paragraphs in the previous contract.

Three of the elements in the new contract, as agreed upon by company and men, have particular interest:

1. The general conditions of employment, including seniority, selection of

runs by men, promotion, etc., were decided upon without trouble.

2. The company is at liberty to hire men who are or are not members of the union—the old contract having this same implication. Neither old nor new contract specifically mentions "closed" or "open" shop. The factor of interest in this liberty of the company is that the road has been so thoroughly unionized that the men did not consider it necessary to provide against employment of non-union labor, feeling sure that all new employees would eventually become members, and the men evidently have the same confidence of maintaining their organization under operation of the Court of Industrial Relations.

3. The new contract provides that there shall be no strike or lockout; that all differences shall be referred to the Court of Industrial Relations and both sides shall abide by the findings of that tribunal.

T. H., I. & E. Released in Electrolysis Case

The Judge of the Circuit Court of Putnam County, Indiana, recently returned a decision in an electrolysis case brought against the Terre Haute, Indianapolis & Eastern Traction Company by the Brazil Gas Company, in which the plaintiff was denied an injunction against the defendant; was declared to be not entitled to recover from the defendant for any damages, expenses or losses alleged to have been sustained, and was not entitled to recover damages in the action. The defendant was awarded judgment accordingly and for the costs laid out and expended.

The finding of facts brought out by the court showed that the gas company on July 31, 1918, filed a petition with the Public Service Commission of Indiana alleging that its underground pipes were being destroyed by stray current from the interurban which passes through a street in Brazil, Ill., that is occupied by a line of pipe of the gas company. The cause of this was alleged to be poorly bonded rails used by the interurban.

During the course of the hearings it was decided that a survey should be made by the Bureau of Standards. Thereafter the commissioners ordered the traction company to rebond its rails in Brazil within sixty days and to install a potential wire approximately 3 miles long with permanent taps to the track and switches provided to connect in a recording voltmeter for a period of one year. The gas company was simultaneously ordered to install within sixty days four insulating joints in the pipe line affected and to report to the commission the voltage drop across each joint. Both companies complied with the order, but the gas company endeavored to recover alleged damages through the court, with the result pointed out previously.

Saginaw Men Out Again

Strike Renewed on Account of City Council Failing to Keep Its Word with Railway

The trainmen on the Saginaw city lines of the Saginaw-Bay City Railway, Saginaw, Mich., went out on strike on Oct. 3 for an increase in wages of 10 cents an hour, the company having declared its inability to grant any further increases in wages until a higher rate of fare should be authorized.

On Oct. 5 the City Council of Saginaw gave the company what were supposed to be definite assurances that if the cars were put in operation the company would be granted fair consideration and the matter of an increased fare taken up immediately with a view of settling the railway question. A provisional agreement was then entered into with the trainmen for a temporary increase of 10 cents an hour pending the results of negotiations with the city.

Since that time the company has had several conferences with members of the City Council. That body has now taken a definite stand that it will not consider any increase in fare unless the company will agree to put on a number of motor buses to serve the outlying factory and residential districts not now being served by street-car lines.

RAILWAY SEEKS RELIEF

The company informed the city in answer to this proposal that it was in need of immediate relief to enable it to carry on the operation of the present system, and that it was impossible to take on any additional financial burden such as would be required by the operation of a number of motor-bus lines. Facing this inability to reach an agreement with the city, the company informed the trainmen that on Nov. 1 their wages would revert to the rate in force prior to Oct. 1. The men refused to work under these conditions and again went on strike Sunday night, Oct. 31.

The company is advertising for men to operate the cars at the same rate of wages paid before Oct. 1 but has not, at the time of this writing, been able to secure any men. Consequently no cars are being operated in Saginaw.

For some time the rate of fare in Saginaw has been 6 cents cash with labor and school tickets at five for 25 cents. The company filed petitions with the City Council of Saginaw on Sept. 1 and Sept. 7 asking for an increase in fare. Effort was made to show the City Council that at the prevailing rate of fare the company was not paying operating expenses and taxes, to say nothing of interest on the investment or allowance for depreciation.

The Council was requested to grant a 10-cent cash fare. As a counter proposal the City Council offered to submit to the people at the Nov. 2 election a proposition for an 8-cent cash fare, with five tickets for 35 cents and school tickets at five for 35 cents. The company needed immediate relief and requested the Council to pass an emergency ordinance granting an immediate increase in fare. This the Council refused to do. The company then offered a counter proposition of 10-cent cash fare, with four tickets for 30 cents and a 5-cent fare for children between the ages of five and twelve. This the Council also refused to consider.

ASK UNIFORM WAGE

The contract with the trainmen expired on Sept. 30. The men had put in a request for increased wages and had stated that they would not work for anything less than was being paid the same company's trainmen on the Bay City lines, where, however, the rate of fare in force is 10 cents cash, with four tickets for 30 cents and 5 cents for children between the ages of five and twelve.

The trainmen in Saginaw were receiving prior to Oct. 1 a maximum rate of 45 cents an hour on two-man cars and 50 cents an hour on one-man cars, while those in Bay City were receiving the corresponding rates of 55 cents and 60 cents an hour. The trainmen were informed by the company that it would be unable to grant any increased wages until it could secure an increase in its rates of fare.

The city of Saginaw permits unrestricted jitney bus competition and during the last few months about twenty large jitneys have been operating on the same street occupied by one of the most important street-car lines.

Interurbans Back Lake Route

Officials of interurbans operating in Indiana and other Middle Western states are much interested in the proposal to create a Lakes-to-the-Sea route, via the Great Lakes and the St. Lawrence River. Indiana business men and manufacturers testified in favor of the project at a recent hearing in Indianapolis before the joint congressional commission. The commission has been conducting an investigation, holding hearings in various cities, to determine the merits of the proposed scheme.

It is contended that if the lake ports were made available for ocean-going craft Gary would become the most important lake port of the state. It is thought that in this case Indiana manufacturers, doing a large export business, would ship materials either to Gary or to Chicago, via interurban. A number of traction officials are said to feel that if the proposed route was put through their lines would benefit.

One of the chief reasons why the traction lines of the state have not further developed their freight business is that there is at present no way of obtaining through business, there being no continuous connection between Indiana and the East. In the case of goods consigned for ocean shipment to ports as close at hand as Gary no such handicap would exist.

National Problems Discussed

Engineers at Chicago Urge Reform in Governmental Departments—Functions of Council Transferred

The Engineering Council met on Oct. 21 in Chicago in a session devoted largely to the making of progress reports and the closing up of affairs preparatory to turning over its functions to American Engineering Council of the Federated American Engineering Societies at the end of this year.

LICENSING PLAN APPROVED

The licensing bill for engineers was approved as a suggested model to be used by any governmental body wherein a discussion of this matter might come up. Some discussion was devoted to the situation in the Patent Office at Washington. The engineers had endeavored during the last session of Congress to correct affairs in the department through a bill to increase salaries of examiners and advance the wages of employees. This bill passed the House, but it was so amended in the Senate that its real object was lost. The result is that the work of the Patent Office is being seriously handicapped through the loss of competent examiners and the council therefore passed a resolution favoring a renewed effort at the next session of Congress to reinstate the original bill as it passed the House.

The most important matter which came before the council for discussion was the report made by M. O. Leighton, head of the national service department, on the status of the movement for the establishment of a national department of public works. In this report Mr. Leighton pointed out that there were two outstanding facts in connection with this movement:

1. The engineers of the country in good faith had started something which they do not now seem inclined to finish.
2. The scope of the movement and its ramifications will extend beyond all limits written or spoken of at the time.

The campaign to bring about the formation of such a national department of public works, said the speaker, had been successful to a degree beyond that anticipated, but the original enthusiasm of so many engineers for the movement had apparently been reduced to a passing interest.

NATIONAL COUNCIL URGED

Mr. Leighton spoke of the meeting held in New York recently at which the conclusion had been reached that confusion in Congress would be avoided by the organization of a Federal Reorganization Council which would act as a common body to carry forward an accepted program embodying the reorganization plans of the numerous interests now working separately along this line. Such a national council was tentatively adopted by the delegates with an agreement to report back to their several organizations for the purpose of securing adoption of the plan. The meeting for final organization will take place on or about Nov. 15.

In case the plan of procedure is followed that has been mapped out, the obvious result will be that a department of public works, if created, will not be an achievement of engineers and architects solely, but of men and women of many professions and vocations.

Mr. Leighton summarized his ideas as to the prospects for a department of public works by declaring it to be his belief that the principle is thoroughly settled in the minds of the public and of the majority of the members of Congress. The important question remaining is the kind of a department that we shall have, civil or military.

News Notes

Four Cents More for One-Man Operators.—Employees of the Wisconsin Railway, Light & Power Company at La Crosse, Wis., on one-man cars will get 4 cents an hour more wages than motormen and conductors on two-man cars. This action, recommended by the State Board of Conciliation, must be ratified by the State Railroad Commission.

Opposes City Ownership. — Judge Nathan L. Miller, Governor-elect of New York State, has not announced definitely what improvements will be effected under his administration in the transportation facilities of New York City. He has said, however, that he is opposed to municipal ownership, but that he will make a comprehensive study of the traction problems in the metropolis before any definite plans are set forth.

A Good Samaritan Needed.—Dr. Frank Crane, of newspaper fame, has written an article in the *Spokesman-Review*, Spokane, on the Federal Electric Railways Commission's report. Dr. Crane points out that while the advisability of private ownership or municipal ownership has not yet been decided on, in the interim, the electric railways should be put on a common sense basis. He says, "The electric railways on their way from Jerusalem to Jericho have fallen among thieves and are sorely bruised. They sadly need a good Samar[illegible]

Co-operation Urge[illegible] directors of the Board of Trad[illegible]dianapolis, Ind., have adopted resolutions calling attention to the fact that the community cannot grow and prosper unless there is a good utility service for homes, factories and business institutions and urging co-operation between the public and the local utilities. The resolutions assert "that without reference to any particular utility, we express our belief that those who provide utility service are entitled to rates that will cover their expenses and give them a reasonable return on their investments."

No Settlement in Syracuse.—The matter of service-at-cost in Syracuse is still pending. A public meeting was held on Nov. 4 in the Common Council Chambers at which members of the commission, representatives of the employees of the New York State Railways and prominent citizens of Syracuse were present. Corporation Counsel Edmund H. Lewis has announced that the city administration will ask the Board of Aldermen to approve or reject the agreement between the railways and the city government without further delay.

An Example for Car Employees.—A conductor in the employ of the Waverly, Sayre & Athens Traction Company, Waverly, N. Y., was charged recently with petty larceny on two counts. After pleading guilty he was sentenced to thirty days in jail with a fine of $25. The offense was "knocking down" fares and reselling tickets which had been collected from passengers. President Rogers of the company has made a statement to the effect that this is the first step that has been taken by railways throughout the State to put an end to dishonesty on the part of employees.

Men Oppose Wage Cut.—Notice has been served upon the London (Ont.) Street Railway Company by a committee of the employees that if an attempt is made to reduce the wages of platform men below the present scale of 52 cents an hour, there will be a general strike. The 52-cent scale was made effective in September after a series of conferences at which company officials agreed to pay a scale based upon the company's earnings after certain charges had been deducted. The men have received word that the earnings of the company, after bond redemption has been provided for, will not be sufficient to pay the 52-cent scale any longer and that a 49-cent scale will soon become effective unless relief is immediately forthcoming.

Wages of Linemen Adjusted.—In the offices of District Attorney Stuart W. Walker, at Martinsburg, W. Va., late in October, a disagreement over the wage scale of linemen in the employ of the Monongahela Valley Traction Company, Fairmont, W. Va., was ironed out as the result of a conference between a representative of the company and the United States District Attorney. Some time ago the company granted its linemen an increase in wages. The increase was not large enough to suit the workers and they asked that it be raised. In order to settle the matter in an amicable way, the linemen selected James Riley, a union leader, to present their cause, and the company named F. W. Lawrence, of Sanderson & Porter, New York. Messrs. Riley and Lawrence conferred and decided to select Colonel Walker as a third member of the arbitration board. Colonel Walker said that the award in the case would not be made public until later.

Financial and Corporate

$1,022,000 Deficit for "L"

Boston Company Under Operation of Public Trustees Has This Amount to Overcome as of Oct. 1

During the period of three months ended Sept. 30, this being the first quarter of the trustees' fiscal year as defined by the public control act, the receipts of the Boston (Mass.) Elevated Railway from all sources have been less than the actual expenditures for the same period by the amount of $1,039,147. Applying to this the balance of $17,080, which represented the excess of receipts over the cost of service during the year ended June 30, gives approximately $1,022,000 as the amount of the current deficit to be overcome as of Oct. 1. In addition to this amount there is $435,348 retroactive back pay which was paid in October, 1919, but applied to the months of May and June, 1919, for which provision has not yet been made.

The actual increase in operating expenses for the past three months over the corresponding period of last year amounted to $872,692. Of this amount the increase in wages chargeable to operating expense totaled $426,000.

Because of the abnormal price that it has been necessary to pay for coal used to produce power, the cost of coal this year as compared with the same three months last year has increased $239,000. The average cost of the coal consumed last year was $5.75 per ton, while for the same three-month period this year it has been $11.50 per ton, and during the month of September the actual cost of the coal consumed was $12.67 per ton.

The increased cost for the three months over the same period last year of the materials used in maintenance and repairs amounts to approximately $160,000.

The month of October, is of course the period of heavy maintenance expenditures for the year This period having been passed, the management expects that the results during the balance of the present year and the first half of next year will provide sufficient excess of receipts over expenditures to overcome the deficit.

RECEIPTS AND COST OF SERVICE OF THE BOSTON ELEVATED RAILWAY FOR THREE MONTHS ENDED SEPT. 30

Receipts		
From fares		$7,850,434
From operation of special cars, mail pouch service, express and service cars		46,258
From advertising in cars, on transfers, privileges at stations, etc		75,172
From other railway companies for their use of tracks and facilities		13,338
From rent of buildings and other property		26,996
From sale of power and other revenue		4,979
Total "receipts" from direct operation of the road		$8,017,179
Interest on deposits, income from securities, etc		98,016
Total "receipts"		$8,115,195
Cost of Service		
Operating Expenses		
Maintaining track, line equipment and buildings		$1,011,297
Maintaining cars, shop equipment, etc		785,484
Power (including 50,537 tons of coal at $11.501—$581,217)		879,143
Depreciation		501,000
Transportation expenses (including wages of car employees, carhouse expenses, etc.)		2,978,089
Salaries of administrative officers		19,812
Law expenses, injuries and damages, and insurance		308,758
Other general expenses		315,928
Back pay		65,527
Total operating expenses (including $4,529,752 for wages)		$6,865,041
Taxes, proportion		401,093
Rent for leased roads (exclusive of subways)		670,711
Proportion of rent of subways and tunnels, to be paid to the City of Boston		382,555
Interest on B. E. bonds and notes		347,748
Miscellaneous items		16,575
Proportion of dividend rental under Acts of 1918		380,841
Proportion of rent of Cambridge subway to be paid to Comm. of Mass		89,775
Total "Cost of Service"		$9,154,342
Net loss for three months		$1,039,147
Revenue passengers	79,324,921	
Receipts per revenue passenger	10.23 cents	
Cost of service per revenue passenger (of which Labor cost 5.71 cents)	11.54 cents	

Aberdeen Up to Date

Operating Ratio 79 per Cent—294 Rides per Inhabitant per Year—Small Deficit Shown

Scotch foresight is obvious from the report of the Aberdeen Corporation Tramways for the year ended May 31, 1920. In preference to showing a deceitful surplus, William Forbes, general manager, recommended that the depreciation and renewal allowance be raised to £22,615 as against £13,877. This policy produced a deficit of £5,203.

FARE INCREASE HELPFUL

This deficit would have been avoided, however, if the fare increase deferred to June 1, 1920, had been made a little earlier. For example, the first ninety-four days following June 1 showed £9,292 more income, due to raising the ½d. six-tenth mile stages to ¾d. (1.5c.), while the 1d. stage was shortened from 1.6 miles to 1.25 miles and a 1.5d. stage introduced to give an average possible ride of 2 miles.

Despite unseasonable weather and the change to awkward fare units the loss in traffic is less than 1 per cent, while the revenue increase exceeds 21 per cent. Aberdeen hopes soon to be in the "no fixed charges" position of Glasgow, inasmuch as the reserve funds now stand at £355,747 against a capital expenditure of £385,878. "Interest on capital" was only £1,526. Statistical comparisons of the current and 1919 fiscal years follow, the 1919 figures being given in parentheses in each case.

EXPENSES ADVANCE 30.79 PER CENT

Gross earnings were £169,731 (£140,901) and expenses £141,852 (£108,451), interest, sinking fund, depreciation and renewals £33,082 (£25,613), net result £5,203 deficit (£6,837 surplus). While revenue increased 20.46 per cent, operating expenses rose 30.79 per cent, mainly due to wage increases and the 48-hour week. Passengers carried were 48,544,709 (41,946,442), an increase of 15.73 per cent, raising the number of rides per inhabitant per annum from 254 to 294 in a city of 165,000. Car-miles were 2,440,087 (2,215,795), or an increase of 10.12 per cent, while the passengers per car-mile were 19.87 (18.9).

MANY PAY REDUCED FARES

Receipts per car-mile averaged 16.69d. (33.38c.) and expenses 13.95d. (27.9c.). The operating ratio was 79.53 per cent. As more than one-third of the riders paid only ½d. fare and nearly all the rest only a 1d. fare the average revenue per passenger was only 0.84d. (1.68c.). At the end of the year Aberdeen had 13.4 double-track miles route and 1.1 miles single-track route. Eight cars were built in the home shops, increasing passenger rolling stock to ninety-two, and six more cars are under way. An important improvement is the general installation of inter-pole high-speed motors.

B. R. T. Deficit Grows

Summary of Operation of System for Year Ended June 30 Shows Loss of $686,725—Gross Receipts Increase $1,200,000

A summary of actual results in operating the rapid transit lines of the Brooklyn (N. Y.) Rapid Transit Company for the year ended June 30, 1920, was issued on Nov. 8 by Kuhn, Loeb & Company and Kidder, Peabody & Company, who are acting as a committee for holders of the corporation's three-year 7 per cent secured notes and of New York Municipal Railway first mortgage 5 per cent sinking fund bonds, series A. The statement, prepared by Stone & Webster, shows an actual deficit of $686,725 in earning fixed charges on these bonds and prior securities, compared with a previous estimate of a deficit of $474,000. The increase of $212,725 in the actual over the estimated shortage of net revenue to meet interest requirements occurred, according to the summary, despite an increase of gross earnings of about $1,200,000. The gross receipts amounted to $19,893,465.

THE report of the engineers to the banking firms notes that the prediction made last year to Federal Judge Mayer has been borne out, namely, that without an increased fare the transit lines would not be able to earn even the fixed charges upon the underlying bonds aggregating $22,937,000 and the notes, bonds and receivers' certificates together aggregating $73,000,000, to say nothing of the $14,654,794 of certificates of indebtedness, representing but a small part of the cost of the elevated lines contributed by the company to the rapid transit system. The report continues:

> The actual results of operation for the past year, as shown by the accompanying table, prove that our prediction was fully justified, and in view of the increase recently made in wages, with the large advance in the cost of coal and even disregarding the cost of the recent strike, that prediction can be reiterated, with even greater force, as applied to the earnings for the fiscal year ended June 30, 1921.

DEFICIT EXCEEDS ESTIMATE

> The actual deficit of $686,725 shown for the fiscal year ended June 30, 1920, an increase of $212,725 over our estimate, was, of course, determined without making allowance for any return upon the city's investment (including cost of completion) of more than $150,000,000 in the city-owned subways, nor is any allowance made for interest to the amount of $879,288 on certificates of indebtedness of New York Consolidated Railroad Company held by the trustee under the first refunding mortgage of the Brooklyn Rapid Transit Company, these certificates being, we are advised, junior to the subway bonds.

INTEREST CHARGES INCLUDED

> The fixed charges on subway bonds (first mortgage bonds of New York Municipal Railway Corporation which are pledged for the 7 per cent notes and 5 per cent notes of Brooklyn Rapid Transit Company) as given in the table which follows, include interest at 5 per cent and the sinking fund charges, so far as chargeable to operation. In addition to the fixed charges shown $1,216,805 of fixed charges on subway bonds and receiver's certificates were chargeable to cost of construction during the year.

The results of the year's operations are summarized in the following table:

COMPARATIVE STATEMENT OF BROOKLYN RAPID TRANSIT COMPANY

Year Ended June 30, 1920	Actual	Estimate
Gross earnings	$19,893,465	$18,675,000
Operating expenses and taxes	16,536,796	14,691,000
Balance	$3,356,669	$3,984,000
Fixed charges prior to subway bonds	$1,254,130	$1,275,000
Miscellaneous rentals	43,312	43,000
Total	$1,297,442	$1,318,000
Balance	$2,059,227	$2,666,000
Fixed charges on 5 per cent subway bonds	$2,745,952	3,140,000
Deficit	$686,725	$474,000

The report says further:

> It will be seen that the gross earnings increased substantially above our estimate, but that the operating expenses and taxes increased by an even greater amount. Our estimate was based on the expectation that the Montague Street and the Queensboro tunnels would be open for operation in the fall of 1919. This expectation was not realized and the two tunnels were not open for operation until August of this year.
>
> The large increase in gross earnings was due to an unprecedented advance in the riding per capita which was general through all of New York City. The disintegration of the surface lines both in Brooklyn and Manhattan, involving an increased cost of riding on those lines, was undoubtedly an important contributory cause.
>
> Unfortunately operating expenses were unexpectedly increased. To provide for the great increase in riding over the old lines additional car mileage was necessary. The cost of maintenance grew rapidly, due principally to the serious advance in the cost of materials and labor. Due chiefly to the unexpected advance in the price of coal the cost of power increased more than $500,000 above our estimate. Taxes also showed a material increase. We believe that the maintenance on the property during the past year has been good.
>
> The reduction in the actual fixed charges below the amount estimated was due to the delay in completion of the new lines and equipment, as a result of which a greater amount of fixed charges on the company's obligations were charged to the construction account and a less amount to the operating account.

With regard to new lines and others under construction the engineers say that, "due to the short time they have been operated, and the disruption of service caused by the strike, no comparison of actual earnings from those new lines with our estimates can as yet be made." This refers to the Montague Street and Queensboro tunnel lines, which were completed and put into operation in August. The statement also is made that other important and necessary construction has been delayed, chiefly on account of the very difficult labor situation.

Denver Interest Defaulted

Ernest Stenger, president of the Denver (Col.) Tramway, has addressed a letter to the holders of the Denver City Tramway first and refunding 5 per cent bonds, notifying them of the default in interest on Nov. 1. Mr. Stenger expresses the hope that the deferment is only temporary and that the financial condition of the company will permit the payment of the coupons prior to the expiration of the period of default. He is also hopeful that the company will in the near future be granted an increase in fare. Mr. Stenger says in part:

> Like other street railways and public utilities this company during the war and since experienced a large and substantial increase in its operating expenses, attributable principally to increased wages and cost of materials, while corresponding increases in rates of fare have not been granted.
>
> On Aug. 1, 1920, practically all of the employees precipitated a strike, causing a cessation of operation in that month and an interference therewith since that time. It is hoped that within a reasonable time increases in fare will be granted by the proper public authorities to offset the above mentioned increases in operation and that thereby impairment of public service and a receivership may be avoided.

Dividend Cut Explained

President of American Light & Traction Company Looks for Upward Turn Soon

Emerson McMillin, chairman of the board of the American Light & Traction Company, New York, N. Y., has issued a statement to stockholders relative to the reduction which was made in the common stock dividends which were paid recently. He calls attention to the poor earnings that have been recorded by the company this year and that the management recommended a cut in dividends to adjust payments to existing bad conditions.

The report for the twelve months ended Sept. 30, last, follows:

	1920	1919
Gross earnings	$4,074,414	$4,081,217
Expenses	396,559	209,027
Net earnings	$3,677,855	$3,872,190
Previous surplus	10,576,260	12,274,167
Total surplus	$14,254,115	$16,146,357
Total dividends	5,048,677	5,570,097
Final surplus	$9,205,438	$10,576,260

Mr. McMillin said in part:

> When the tide turns we will promptly recommend a readjustment of dividends to the then condition of earnings. To those who object to the continuance of stock dividends, let me call your attention to the fact that we are obliged to expend millions every year in extensions, additions, and improvements. These expenditures are generally met by issuance of bonds.
>
> Our company has preferred to make these from earnings and then issue stock dividends for same, or for part of the expenditures. In this way the stockholder can get some return on his investment, which has been buried in the ground and to that extent keeps its property free from an increased mortgage debt.
>
> The quarter ending Sept. 30, 1920, is the worst in our history. The quarter ending Dec. 31, 1920, will be bad, chiefly because of high costs. But we will be receiving better prices. With the closing of the year 1920 we will have passed the peak of high costs, probably, and at any rate will be receiving, we feel assured, much fairer prices.
>
> At the beginning of this year the officers were encouraged to believe that we had passed the peak of high costs, and that the companies' earnings would gradually increase. But by April the wild spasm of higher priced coal was launched and that product went up from $3 per ton at the mines to as high in some instances as $15 per ton. But $9 was almost universally asked and those who were compelled to buy had to pay from $7 to $10 per ton. Labor at the same time was demanding and receiving increases. The result was from that time on to very recently our increase in earnings rapidly disappeared and the first eight months of 1920 showed more than $300,000 decrease, compared with the same period in 1919.

Road May Not Suspend

Although bondholders of the Cumberland Railway, Carlisle, Pa., had announced that operation of the road would be discontinued on Nov. 1, there is still a possibility that the line will not be abolished.

L. C. C. Trams Win and Lose

Continued Increase in London Street Railway Traffic at Higher Fares Does Not Offset Expenses

The report of the London County Council Tramways for the year ended March 31, 1920, shows that by that time at least the heavy riding of war years had not abated, despite the restoration of diminished bus services. Compared with the preceding fiscal year, passenger traffic rose from 636,157,361 to 685,124,156 and car-miles from 48,052,801 to 53,156,060. However, the number of passengers per car-mile dropped from 13.24 to 12.89 because the management finally was in position to put cars in shape for service without dismantling others to secure repair parts—a war-time expedient! At that, the traffic density in the year ended March 31, 1914, was only 8.86 passengers per car-mile.

RECEIPTS increased from £3,469,165 to £4,168,512, equivalent to an increase from 17.87d. (35.74 cents) to 19.4d. (38.8 cents) per car-mile, whereas revenue per car-mile in the last pre-war year named was only 8.9d. (17.9 cents). The increased revenue came partly from the greater density of traffic and partly from the increased average fare per passenger, which was 2.02 cents in 1914, 2.62 cents in 1919 and 2.92 cents in 1920 fiscal year. The fact that the London County Council Tramways system has to compete with much duplicating bus service over largely the very same routes, that it is physically shut off from the most profitable traffic area and that a lot of business is also carried by rapid transit lines keeps it from attaining the density of traffic and good load factor possible in other British cities where these handicaps are absent.

OPERATING EXPENSES OUTSPEED INCOME

In the fiscal year ended March 31, 1919, the tramways escaped a deficit with the tiny surplus of £8,069. In the following year, however, the deficit after meeting all debt charges was £100,712. This came about through a rise from £2,858,414 to £3,646,781 in operating expenses, a change which will be better understood by saying that car-mile expenses rose from 14.27d. (28.54 cents) to 16.62d. (33.24 cents) compared with 6.5d. (11 cents) in 1914 fiscal year!

In accordance with Parliamentary regulations applying to municipal undertakings, part of the capitalization must be written off annually in specified ways. Thus the net debt has been reduced from £9,923,528 in fiscal year 1914 to £8,086,570 in the last fiscal year. The fixed charges of the L. C. C. are much higher per mile than other British systems owing to the enforced use of the conduit system and extraordinary street widening charges.

No contributions have been made in relief of rates (taxes) since March 31, 1903. Nevertheless, the tramways this year paid the municipal governments £168,203 in property taxes and £34,424 interest and redemption charges on street improvements. Like any private corporation, income taxes must be paid to the National Government, that item alone amounting to £117,646 in the year ended March 31, 1920, while fixed charges were £675,324.

Up to May-June, 1918, the most-used ride—the penny—was good for 2 miles; from that date to May, 1919, the distance was 1.8 miles; from May, 1919, to April, 1920, 1.5 miles, and from April, 1920, to September, 1920, 1.2 miles. The present penny fare is good only for 0.6 mile. Children are charged 1d. for 1.5d. and 2d. stages, 2d. for 3d. and 4d. stages and 3d. thereafter. Workmen's tickets are now only of round-trip character with a minimum of 2d. for 3.6 miles round trip, 4d. for 7.2 miles and 6d. for further distances.

Since April, 1920, also the tramways have charged a 2d. (4-cent) universal fare good between specified terminals during 10 a.m. to 4 p.m. Mondays to Fridays inclusive except on bank or legal holidays. One purpose of this much-debated experiment is to increase off-peak riding; another, and some say the main purpose, was to make life miserable for the competing London General Omnibus Company. The latter, after vain efforts to have the mid-day fare abolished, followed suit on Sept. 27 so far as city traffic is concerned, although in a letter of Sept. 24 Lord Ashfield, chairman of the bus company, wrote that he considered the idea economically unsound. In the comparisons given above, 1d. is quoted for convenience as being the equivalent of 2 cents. Actually with exchange at $3.60 the equivalent of one penny would be 1½ cents.

The physical property of the L. C. C. at the end of the fiscal year detailed was 144 miles double and 5.1 miles single-track route; 1,376 double-truck, 240 single-truck, fifty steel subway cars used in the Kingsway tunnel, and 158 trail cars. The average number of cars in daily use was 1,248 motors and 115 trailers. The average schedule speed was 8.91 m.p.h. This is very good indeed considering the fact that the standard individual motor car is a seventy-eight-seat double-decker.

Interborough Still Showing Improvement

After deducting interest, rentals, etc., the Interborough Rapid Transit Company, New York, N. Y., for the month of September shows a deficit in its net income of $510,227 against a deficit of $484,722 for the corresponding month of the previous year. Compared with the August deficit of $658,482 the Interborough is showing an improvement.

SUMMARY OF EARNINGS OF INTERBOROUGH RAPID TRANSIT COMPANY

Month Ended Sept. 30, 1920	1920	1919	Percentage Change Over 1919
Gross operating revenue	$4,326 560	$3,842,198	12.6
Operating expenses	2,905,293	2,513,214	15.7
Net operating revenue	$1,421,267	$1,329,984	6.9
Total taxes	217,361	213,536	1.8
Income from operation	$1,203,905	$1,116,447	7.8
Non-operating income	53,664	44,985	24.8
Gross income	$1,257,569	$1,159,433	8.5
Interest, rentals, etc., including Manhattan guarantee	1,767,797	1,644,155	7.5
Net Corporate Income (exclusive of accruals under the provisions of Contract No. 3 and related Certificates which under these agreements with the City are payable from future earnings	*$510,227	*$484,722	— 5.3
Operating per cent	67.15	65.38	
Passengers carried (revenue)	80,664,382	71,528,478	12.8

Three Months Ended Sept. 30, 1920	1920	1919	Percentage Change Over 1919
Gross operating revenue	$12,442,573	$10,964,269	13.5
Operating expenses	8,482,088	7,031,204	20.6
Net operating revenue	$3,960,484	$3,933,063	0.7
Total taxes	653,131	640,609	2.0
Income from operation	$3,307,353	$3,292,455	0.5
Non-operating income	158,142	134,946	17.2
Gross income	$3,465,496	$3,427,401	1.1
Interest, rentals, etc., including Manhattan guarantee	5,177,631	4,951,608	4.6
Net Corporate Income (exclusive of accruals under the provisions of Contract No. 3 and related Certificates which under these agreements with the City are payable from future earnings	*$1,712,135	*$1,524,207	—12.4
Operating per cent	68.17	64.13	
Passengers carried (revenue)	$231,251,570	$202,878,894	13.9

* Deficit.

For the three months ended Sept. 30, 1920, there was a deficit of $1,712,135. This was a decrease of 12.4 per cent over the corresponding period of 1919. In September the Interborough carried 9,135,904 more passengers than it did in the same month of 1919. For the three months ended Sept. 30 the revenue passengers carried increased 12.8 per cent.

Frank Hedley, president of the company, recently issued a statement in which he declared that the present 5-cent fare was inadequate.

Youngstown Refinancing Approved

The Ohio Public Utilities Commission has approved the plan for the refinancing of the utility properties centering at Youngstown, Ohio, discussed in the issue of Nov. 6, page 985. The commission has issued an order authorizing purchase by the Pennsylvania-Ohio Power & Light Company of the properties of the Pennsylvania-Ohio Electric Company, a subsidiary of the Republic Railway & Light Company, and has authorized the former company to issue bonds, notes and capital stock with which to secure funds to pay for the properties acquired. These properties are appraised at $27,200,000. Ownership passed to the company on Nov. 1.

The commission has authorized the Pennsylvania-Ohio Power & Light Company to issue these securities to pay for the properties: First and refunding mortgages of $13,000,000 at 7½ per cent, to be sold at 90; general mortgage 8 per cent bonds of $3,375,000, to be sold or pledged at 66⅔ per cent; 8 per cent 10-year collateral trust notes of $2,250,000, to be sold at 87; 8 per cent cumulative preferred capital stock of par value of $1,800,000, to be sold at 84; common stock of $10,000,000, to be issued and delivered fully paid and non-assessable.

An increase in the capital stock of the Pennsylvania-Ohio Electric Company, from $10,000,000 to $25,000,000, has been authorized. The refinancing plan is for the purpose of rearranging subsidiary companies and segregating railway, power and light companies.

Gas Law Declared Confiscatory

Judge Julius M. Mayer, in the United States District Court at New York, has handed down an opinion in which he indicates the form of the decree finding what is called the 80-cent gas law of 1906 unconstitutional in so far as it applies to the New York & Queens Gas Company. In the locality in which the company operates the statute allowed a charge of $1 per 1,000 cu.ft., however, but in other respects the case is similar to those of the Consolidated Gas and other companies which have been before the court in recent months. Judge Mayer summarized the findings of the special master who took testimony and substantially confirms the report. He states that the cost of making and delivering gas to the consumer by this company was $1.0076 without making any allowance for return on investment.

Judge Mayer emphasizes the fact that the court is not a rate making body and he refrained from indicating a figure which would be proper to establish as the price under the decision. In discussing this matter he shows that the cost of producing gas has been increased through conditions arising from the war and also through economic factors arising from industrial conditions, and he especially instances the cost of oil which now enters so largely into the making of gas, which has been greatly increased because of the use of oil for purposes not foreseen fourteen years ago.

He adds that the matter of fixing a new price rests with the Legislature and he expresses the hope that it will receive prompt and intelligent treatment from that body. As it might be cited as a reason for the delay on the part of the Legislature if the court should indicate a new price to be charged no such action will be taken, but the tribunal will merely declare the statute confiscatory under present conditions and therefore unconstitutional.

Reorganization Plan Abandoned

Elliott C. McDougal, chairman of the bondholders' protective committee of the International Traction Company, Buffalo, N. Y., has announced that the plan for the reorganization of the corporation has been abandoned. A defective notice of the plan given to the depositing bondholders and opposition developed by supporters of George K. Reilly, a Philadelphia banker, are given as reasons for abandoning the reorganization plan.

Plans are now being prepared by Mr. McDougal and leaders of the bondholders' committee for the submission to depositing bondholders of a modified proposition which it is hoped will meet with the support of the objecting bondholders, headed by Mr. Reilly, J. M. Johnston and R. M. Stinson, dealers in investment bonds in Philadelphia. Thomas E. Mitten, a member of the bondholders' committee and a big factor in the management of the International Railway, contends that the attitude of Reilly is a move to discredit his plans of management and operation of the property.

No date has been set for a meeting of the bondholders' protective committee, but Mr. McDougal has stated a conference will be held within the next two weeks.

Receivership Suit Dropped

The suit has been dropped in which a receiver was asked for the Toledo & Western Railroad, Toledo, Ohio. It was started in Common Pleas Court at Toledo, on petition of Frank Nevine, a holder of bonds of the company, who declared that the road was not meeting its debts and was allowing its equipment to deteriorate. He sued for $300. The company confessed judgment and paid the court costs upon agreement that the receivership proceedings should be dropped.

Recently the road defaulted on interest payments on its bonds. It has had difficulties for several years but according to officers is now beginning to get back on a paying basis. Recent tariff revisions by the Interstate Commerce Commission and increased passenger fares have brought up the earnings of the company. The road is operated by the Doherty interests and operates 86 miles of line, connecting Toledo with Sylvania and other towns.

Financial News Notes

Final Decree in Syracuse Case.—A final decree of dissolution of the Empire United Railways, Syracuse, N. Y., now the Empire State Railroad, which went into bankruptcy in 1915, has been handed down by Supreme Court Justice Leonard C. Crouch. The court has denied the applications for preferential payment, amounting to more than $10,000. The Railway Audit & Inspection Company was ordered paid $3,152 for furnishing conductors and motormen prior to the bankruptcy. C. Loomis Allen, now vice-president of the Syracuse & Suburban Railroad, who was receiver, was ordered paid $5,000. The assets of the company will be distributed by the receiver on a proportionate basis among the creditors. The total sum owing creditors is in the neighborhood of $8,000,000.

Would Merge Two Roads.—Nathaniel T. Bacon, who recently purchased the Sea View Railroad, Wakefield, R. I., formerly owned by the Rhode Island Company, has proposed a plan of consolidation of the road with the Narragansett Pier Railroad, of which he is the president. It is proposed to organize a new company with $500,000 capital stock, half in 7 per cent cumulative preferred and half in common, the preferred to be taken by the present owners in payment for the physical assets and the towns along the line to take the common stock at par to provide the necessary capital. The towns would pay for the stock in 4 per cent town bonds. The combined valuation of the properties involved is placed at $1,050,359. The plan will be acted upon at an early date.

Real Estate Sale Brings $390,000.—Three parcels of land belonging to the New York (N. Y.) Railways were sold at auction on Nov. 9. A total of $390,000 was realized. The parcels sold included the minor holdings, two large carhouse plots being passed by without a bid. It was announced that these will be offered again on Dec. 7. Sale of the properties is subject to the approval of the United States District Court, in which Judge Julius M. Mayer is presiding. The sale was ordered on an application of Job E. Hedges, receiver for the New York Railways, and held under the auspices of former Presiding Justice Francis M. Scott of the Appellate Division, who had been appointed special master by Judge Mayer. Both Mr. Hedges and Justice Scott were present at the sale, as were representatives of Stetson, Jennings & Russel, attorneys for the Guaranty Trust Company of New York, trustee for the New York Railways bondholders.

Traffic and Transportation

Buses Under Ban

New Haven Aldermen Repass Ordinance Restricting Jitneys—Hartford Ordinance Upheld by Court

The Board of Aldermen of New Haven, Conn., on Nov. 8 passed an ordinance ruling jitneys off the principal streets served by the Connecticut Company. This ordinance is identical with the one passed by the board on Sept. 13, but vetoed by Mayor Fitzgerald on the ground that the public hearings conducted on July 26, Aug. 6 and Aug. 16 were held on the trolley-jitney question in general, and not to consider a proposed ordinance, as required by law. The Mayor is expected to sign the new bill, his only objection to the previous measure being based on this technicality.

FINES FOR LAW BREAKERS

The anti-jitney measure, after specifying the routes which the buses will be allowed to follow, provides that:

> All persons operating public service motor vehicles while carrying passengers for hire, or soliciting persons to become such passengers shall keep to the traffic routes designated and fixed by Section 1 of this ordinance.
>
> Any person, firm or corporation violating any of the provisions of this ordinance shall forfeit and pay a fine of not more than $100 for each offence.

Jitneys are again operating within the limits of Waterbury, the Waterbury City Council having repealed the ordinance barring them from the streets. The measure was repealed by the Council following the raising of the fare on the electric lines to 10 cents straight.

The Superior Court on Nov. 6 denied the application of the Jitney Owners' Association of Hartford for an injunction restraining the city from enforcing the terms of an ordinance relegating the buses to the side streets. The court held that in enacting the anti-jitney measures the city authorities had not exceeded the powers granted them by the General Assembly of the state. The court's opinion said in part:

> The fixing of routes and schedules for jitneys is an appropriate exercise of the regulatory power of states and municipalities.
>
> It is the claim of the applicant, however, that this ordinance is so unreasonable in its provisions as to render it null and void.
>
> An ordinance is reasonable (in the sense that it is not invalid on the ground of unreasonableness) if it tend in some degree to accomplish the object for which the legislative power was given.

HARTFORD BUS OPERATORS JAILED

Failure of the injunction proceedings has given rise to a demand on the part of the Hartford jitney men that the City Council repeal the present ordinance. The whole question was to come before the Council this week on a petition from the Jitney Owners' Association. This petition is said to have been signed by several thousand citizens. If the present law is repealed the Connecticut Company is expected to withdraw service from its Hartford line, as it did in the case of Bridgeport.

Six jitney drivers were arrested on Nov. 8 because they persisted in operating their machines in defiance of the city ordinance. The battle between the trolleys and the jitneys in Hartford has been brewing for a year. It came to a head on Oct. 22 when the State Public Utilities Commission ruled that the Connecticut Company might charge a straight 10-cent fare on all its lines within the state. The bus operators have been placarding their buses with posters reading:

> The trolley car company charges you 10 cents. We charge you only 5 cents. Help get the lower fare by protesting to the City Council to repeal the city ordinance right away, so that the jitneys may be restored to the streets of Hartford.

Seven Cents in Kenosha

The Wisconsin Railroad Commission on Oct. 30 authorized the Wisconsin Gas & Electric Company, Kenosha, to increase the fare on its lines in Kenosha to 7 cents cash with eight tickets for 50 cents. The increase in rates was made necessary by the recommendation of the State Board of Conciliation, approved by the commission, increasing the wages of trainmen and other employees in the transportation department of the company. The company offered testimony to the effect that for the year ended Sept. 30 the railway department had available after depreciation a net return of $2,887 on a valuation of $486,000. It is estimated that the wage increase would amount to approximately $13,700 a year.

In connection with the rate case the commission considered the matter of service. In a previous decision it had recommended a number of extensions of the company's lines. Compliance with these suggestions the company had found inadvisable if not impossible because of the difficulty of obtaining money. It has, therefore, provided a bus service over three of the four proposed track extensions, which is being operated in every way as a part of the railway system. The operation of the buses for a period of one month indicated that the proposed track extensions would be unprofitable as the bus revenues are too low to pay running expenses. After considering the matter the commission held that the buses are furnishing a much-needed service and that their operation should continue. Under the circumstances, it was of the opinion that the revenues and expenses of bus operation are properly included in the utility business.

Court Again Intervenes

Federal Judge Appoints Masters to Report on Des Moines Case—Fare Solution Sought

Judge Martin J. Wade, of the Federal District Court, has named three masters to devise a plan whereby the receipts of the Des Moines (Iowa) City Railway may be increased to meet the necessary expenses of interest, operation and fixed charges. In appointing the masters Judge Wade calls attention to the fact that the present 6-cent fare is not sufficient to meet the current expenses and pay any material amount on the back wages of the employees.

The appointees are John A. Guiher, of Winterset, Iowa, a member of the State Railroad Commission; E. D. Perry, a Des Moines attorney, and Paul Beer, manager of the Flynn Dairy Company, Des Moines, whose training has been along engineering lines.

TEMPORARY SOLUTION SOUGHT

The position of the masters, according to the memorandum of the court, will be to look over the field, confer with representatives of the city and with the receivers and suggest to the court some method by which receipts may be made to equal expenditures. They will also be expected to take into consideration the question as to whether it is not possible to increase the service.

The masters will not be called upon to conduct an extensive investigation, since Judge Wade holds that the question is only a temporary one in that the Iowa Legislature will meet within the next few weeks and he expects some action to be taken there to meet the rate situation in Des Moines and other cities of the State. "I am only endeavoring to find a way to keep the cars running until some permanent plan can be agreed upon and I do not see how this can be done without legislative action," said Judge Wade.

In his ruling Judge Wade summarizes the local traction situation as follows:

1. With few exceptions Des Moines has lower street car fares than any city in Iowa.
2. Des Moines car men get more pay than those in other cities in the State with one exception.
3. Every advance in wages has been earnestly requested by the city and opposed by the receivers so that no one can contend that so far as the receivers are concerned they are responsible for the unwarranted expenditures.

INSOLVENCY COMMON KNOWLEDGE

4. The Des Moines City Railway is insolvent and was insolvent when the franchise was granted, of which every one had common knowledge because its indebtedness was a matter of common knowledge.
5. The company has not made a profit since the franchise was granted.
6. There is no source of payment for certain interest charges and fixed charges and the expense of operation which must be paid except fares.
7. Books are kept open and the court has been open to hear any criticism.
8. The 5-cent fare prior to the last rise in wages just about paid running expenses and fixed charges.
9. One cent additional fare was added to cover the last raise in wages and the court assumed that it would pay current advanced wages and back wages within a few months.
10. With increase in fare travel was decreased so that extra one cent is not sufficient to cover certain expenses as expected.
11. There is a deficiency at present which must be made up.

Eight-Cent Fare Made Permanent

Chicago Surface Lines Granted Rate to Yield 7.5 per Cent Return—Commission Places Valuation of $159,113,114 on Properties

The Illinois Public Utilities Commission on Nov. 8 made public its decision on the valuation of the Chicago Surface Lines for rate-making purposes. This valuation, as of April 30, 1920, was fixed at $159,113,114. To enable the company to earn a reasonable rate of return, which the commission finds to be 7.5 per cent, the temporary order of the commission for a straight 8-cent fare was made permanent. This order of the commission comes directly after hearings at which the representatives of the Chicago City Hall endeavored to convince the commission that it should not grant any further rate increases nor fix any more valuations during the remaining period of its existence. It will be recalled that the Republican candidates on the Mayor Thompson ticket in the recent campaign were elected by a very large majority, their principal fight in the campaign having been waged on the platform of abolishing the public utilities commission and re-establishing 5-cent fares.

AT the hearings, Chester E. Cleveland, special counsel for the city, declared that the people by an overwhelming vote had registered their disapproval of the actions of the Public Utilities Commission and that in the face of this condemnation the commission should cease to issue any further orders. The city sought to frustrate the work of the commission in establishing a valuation and permanent rate by renewing the appeal in the Circuit Court for an injunction to prevent the companies from charging an 8-cent fare in violation of their contracts with the city calling for a 5-cent fare. The court has held several hearings on this case but had reached no decision at the time of this writing.

The present order of the commission as to valuation and rate of fare is the outgrowth of a petition filed on Aug. 2, 1919, by the four corporate companies operating under the designation of the Chicago Surface Lines. In their petition the companies asked the commission to establish such rates of fare as would provide a fair return upon the valuations established by agreement in the 1907 ordinance contracts. The original valuations fixed in these ordinances for the respective companies follow:

Chicago Railways	$29,000,000
Chicago City Railway	21,000,000
Calumet & South Chicago Ry.	5,000,000
The Southern Street Railway	775,000
Total	$55,775,000

The amount added to capital account upon certificates of the Board of Supervising Engineers from Feb. 1, 1907, to June 1, 1919, was as follows:

Chicago Railways	$61,805,533
Chicago City Railway	33,011,570
Calumet & South Chicago Ry.	6,184,105
The Southern Street Railway	924,254
Total	$101,925,462

The total capital valuation of the respective companies as of June 1, 1919, were therefore represented to be:

Chicago Railways	$90,805,533
Chicago City Railway	54,011,570
Calumet & South Chicago Ry.	11,184,105
The Southern Street Railway	1,699,253
Purchase price	$157,700,461

While the surface line companies sought to obtain only a fair and reasonable rate of return upon this agreed purchase price, they nevertheless offered to prove that the fair value of the property devoted to the public service is more than the agreed purchase price when ascertained by consideration of the cost to reproduce, the original cost, investment, present value, all overhead, including such preliminary costs as engineering supervision, interest, insurance, organization and legal expenses during construction, contingencies, and all other elements of value. They further offered to prove that they should be permitted to earn a just and reasonable return upon not less than the aggregate purchase price.

COMMISSION'S JURISDICTION QUESTIONED

The city of Chicago, in answer to the petition of the companies, sought to establish that the commission was without authority to change or modify the rates of fare, since these were specified in contracts which were considered valid and binding between the city and the companies. The city said that if the petitioners charged fares in excess of those fixed by the ordinances, either with or without the authority of the commission, such action would amount to a repudiation of the contract ordinances and give the city the right to cancel the privileges granted. It contended that in view of the large benefits received by the stockholders in the past, the burden resulting from increased cost of maintenance and operation should be borne by them.

It also contended that the capital account or agreed purchase price was inflated by $75,000,000 over the fair value of the properties employed in the public service. The city also made various other representations among which was one that the service given is inadequate and inefficient and does not justify an increase in fare, and another that the company should be required to spend $9,000,000 accumulated in the renewal fund to meet increased expenses.

Despite the representations of the city, the commission subsequently issued several temporary orders increasing or changing the rate of fare, and these orders were challenged in the courts and finally upheld by the Supreme Court of the State.

The hearings for the purpose of determining the valuation of the properties commenced on Sept. 8, 1919, and closed on June 15, 1920. The order of the commission gives a full review of the testimony taken, the evidence submitted and various matters pertaining to the final decision of the commission, consuming forty pages of the printed order, which is known as No. 9357.

In support of the contention that the value of the properties used in the public service is in excess of the agreed purchase price, the companies submitted data to substantiate the following values: Based on unit prices as of April 1, 1919, the cost to reproduce new was set at $200,371,689; based on unit prices as of April 1, 1920, $247,246,637; based on average prices for the six-year period from 1914 to 1917, $164,812,046; and based on the average prices for the seven-year period from 1914 to 1920, $176,588,415. In contrast with these figures, the city submitted valuations purporting to show that the cost to reproduce new the property, based on unit prices as of April 1, 1919, was $186,335,695; and on the basis of average prices for the period from 1915 to 1919, was $157,704,406. The cost to reproduce new less depreciation as of April 1, 1919, was shown by the companies to be $164,453,284 and by the city, $139,644,835.

In connection with these values the city contended that various items totaling $9,095,027 should be excluded from the value of the property, as it represented property not used or useful in the service to the public. In this connection the commission found that the claims of the city were not sustained, but pointed out that the final ruling on the petition, in which the applicants limit the valuation which they ask to the amount of the agreed purchase price under the city ordinances, is the same whether the property to which the city objects is included or excluded.

The commission found that the cost to reproduce new, including certain defined eliminations and corrections, is $170,000,000, as of Jan. 31, 1919. The cost to reproduce the property new less depreciation was established as $143,900,000. Going value was found to be $20,000,000. The present value for rate-making purposes as of Jan. 31, 1919, excluding franchise values, going value and all other intangible values, is $143,500,000. Including the element of going value, the value is established as at least $163,500,000.

The commission further finds that, eliminating from consideration the property which the city claims should be excluded from the inventory of the useful properties, the present value for rate-making purposes on Jan. 31, 1919, is at least $157,164,908. Between Jan. 31, 1919, and April 30, 1920, there were additions to the property of which the commission finds the present value to be $1,948,206. Making these additions to the inventory of Jan. 31, 1919, the commission finds that the present value of the property as of April 30, 1920, with eliminations claimed by the city, is at least $159,113,114.56.

The commission states that this figure "is the one which we find as the rate base in this case for the reason that the petitioners in their application have limited themselves to the amount of the capital account and have sustained their application, even if the contention of the city as to the rejection from the inventory of certain property herein above mentioned is sustained."

GRANTS 7.5 PER CENT RETURN

As to the rate of return, the commission finds that the companies are entitled to earn an amount sufficient, after paying operating expenses and taxes, and after setting aside what is reasonably required to take care of depreciation, to pay a return of 7.5 per cent upon the present value of the properties. The amount necessary for this purpose is found to be $11,933,483. The allowance for depreciation is set at 8 per cent of the gross receipts, as provided by the city ordinances. This amounts to about 3 per cent on the value of the property as established by the commission. On the basis of a uniform 8-cent fare, it is estimated that the annual gross earnings of the company will probably not exceed $62,600,000. The amount required annually to take care of operating expenses, including additions to the renewal fund and taxes, will probably not be less than $47,400,000. On the basis of these estimates, an 8-cent fare will provide a residue of approximately $15,200,000. After deducting from this amount the city's 55 per cent share under the terms of the ordinance, there will remain as the annual earnings of the companies not more than $11,250,000. The commission points out that this is less than the amount which has been found above as the amount which the petitioners are entitled to earn.

The order of the commissioners was concluded by a statement that it has in view the possibility and probability of readjustments of operating expenses resulting from a return to normal conditions, and that the right is reserved to the commission to hear proceedings in this connection as well as to the sufficiency and adequacy of service, at any time in the future.

Will Survey Sacramento Lines

A survey of the Sacramento lines of the Pacific Gas & Electric Company, Sacramento, Cal., will be made by the California Railroad Commission, to determine whether the company is in need of financial relief. The railway recently applied to the commission for authority to raise its fare, leaving the fixing of the new rate to the commission. The present fare is 5 cents. At a recent hearing before the commission a valuation expert, representing the company, testified that an immediate increase in fare was needed to enable the company to earn a fair return on the value of its railway properties in Sacramento.

Six-Cent Fare in Cleveland

New Rate Expected to Continue for a Period of Six Months at Least —Company Must Recover Much Lost Ground

Patrons of the Cleveland (Ohio) Railway will pay a 6-cent cash fare beginning Nov. 14. An additional cent will be charged for a transfer, with no rebate. Tickets will be sold at the rate of nine for 50 cents. This is the first time under service at cost in Cleveland that the cash rate has been more than 5 cents. When the new rate goes into effect the company will have only $100,000 in the interest fund. As the interest fund must be built up to $700,000 before there can be another change in the fare, the prospects are that the rate which goes into effect on Nov. 14 will have to be continued for six months at least.

THE statement of earnings of the company for September, made public on Nov. 4, shows an actual deficit of $201,688. This was largely due to heavy costs for maintenance, power and labor. The statement for September is shown on the following page.

In the decade under service at cost in Cleveland since 1910 the fare has gone from 3 cents cash, with 1 cent for a transfer and no rebate, to the proposed 6-cent fare. Still Clevelanders are not complaining. There has been a constantly growing cumulative effect of the educational work carried out in connection with the operation of the company under the present arrangement with the result that appreciation has become general of the fact that costs must be reflected in the rate of fare. Just how the fare has changed from time to time under service at cost is shown in the above table.

CLEVELAND FARES UNDER SERVICE AT COST

From March 1, 1910, to May 31, 1911, rate e, 3 cents cash fare, 1 cent transfer, no rebate.

From June 1, 1911, to Aug. 31, 1914, rate f, 3 cents cash fare, 1 cent transfer, no rebate.

From Sept. 1, 1914, to Dec. 14, 1917, rate e, 3 cents cash fare, 1 cent transfer, no rebate.

From Dec. 15, 1917, to Dec. 25, 1917, rate d, 4 cents cash fare, three tickets for 10 cents, 1 cent transfer, 1 cent rebate.

From Dec. 26, 1917, to April 2, 1918, rate c, 4 cents cash fare, three tickets for 10 cents, 1 cent transfer, no rebate.

From April 3, 1918, to April 9, 1918, rate b, 4 cents cash fare, seven tickets for 25 cents, 1 cent transfer, 1 cent rebate.

From April 10, 1918, to Aug. 3, 1918, rate a, 4 cents cash fare, seven tickets for 25 cents, 1 cent transfer, no rebate.

From Aug. 4, 1918, to July 5, 1919, rate 2, 5 cents cash fare, five tickets for 25 cents, 1 cent transfer, no rebate.

From July 6, 1919, to Dec. 15, 1919, rate 3, 5 cents cash fare, eleven tickets for 50 cents, 1 cent transfer, no rebate.

From Dec. 16, 1919, to May 11, 1920, rate 4, 5 cents cash fare, six tickets for 25 cents, 1 cent for transfer, no rebate.

From May 12, 1920, to Nov. 13, 1920, rate 2, 5 cents cash fare, five tickets for 25 cents, 1 cent for transfer, no rebate.

From Nov. 14, 1920, to May 1, 1921, rate 1, 6 cents cash fare, nine tickets for 50 cents, 1 cent for transfer, no rebate.

Under the Cleveland plan fares increase automatically when the interest fund drops below $300,000. On Aug. 31 the fund was $316,154. The interest fund, which is the gage for fares, is figured on allowances and not on actual expenditures. Operations for September showed a deficit in this fund of $60,031. It is estimated that on Nov. 14, when the advance recently announced goes into effect, the balance will be less than $100,000.

This condition of the interest fund takes no account of the actual financial condition of the company. In addition to building up the interest fund to the point where fares may be reduced ($700,000) the company must wipe out deficits in the maintenance and operating reserve funds, and write off the capital value of certain road and equipment costs, aggregating $1,500,000. This in itself necessitates taking from revenue approximately $100,000 a month.

Mounting costs have outstripped the ordinance allowances. In consequence last month Council agreed to increase allowances of 28 cents a car-mile for operation and 10 cents a car-mile for maintenance to 29 cents for operation and 11 cents for maintenance. The Council also agreed to permit the company to reimburse itself for the deficiency incurred up to Oct. 1 at the rate of not less than $25,000 a month. Actual deficits in the road and equipment and three other accounts are being extinguished at the rate of $20,000 for each of the accounts, or $80,000 a month for the four accounts.

Under the new rates of fare the maximum has been reached that is provided in the Tayler settlement. This would seem to prove, if it proves anything, that even under the wisest settlement plan it is impossible for any set of men to project themselves very far into the future. The present service in Cleveland, all things considered, would seem to leave little to be desired. Still the necessity exists for extensions and improvements owing to the natural growth of the city. How best to bring these about is the problem now before the city and the company. The opinion seems to prevail that funds for such work can best be realized by the sale of the remaining $4,000,000 of stock of the company. The Cleveland Railway stock is held primarily for investment by some 5,500 stockholders, most of whom are local residents. The element of risk having been removed from the stock under the plan of the guarantee of the dividends, the quotation of $94 a share is regarded as purely nominal. Moreover, holders know that should the city at any time elect to take over the property then the stock, representing the actual investment of the company in plant and equipment, is callable at a premium of $10 a share.

Reference has been made before in the ELECTRIC RAILWAY JOURNAL to the proposal to carry out the plan of expansion by disposing of stock. That plan is receiving the very careful attention of the management as to the means that can best be used. The plan to increase the dividend rate from 6 per cent to 7 per cent went down to defeat despite the general recognition that investors in times like these can command a premium on money which they loan; but despite this the company hopes soon to announce a program under which stock will be sold at such favorable terms that the number of holders among local people will be greatly increased. With such extension of home ownership will come, of course, an even keener appreciation on the part of Clevelanders of the problems of the company than exists at this time.

INCOME ACCOUNT OF THE CLEVELAND (OHIO) RAILWAY FOR SEPTEMBER, 1920, COMPARED WITH LAST YEAR

	September		From Jan. 1	
	Amount	Per Cent Increase	Amount	Per Cent Increase
I. Based on ordinance allowances:				
Operating revenue	$1,461,716	12.91	$12,697,710	11.84
Ordinance allowances	1,239,303	24.78	10,128,349	34.84
Balance	$222,413	26.21*	$2,569,361	33.14*
Special allowances	60,000	......	735,530	.....
Net operating revenue	$162,413	32.72*	$1,833,831	38.30*
Non-operating income	11,468	16.80*	130,970	17.38*
Gross, less allowances	$173,882	31.86*	$1,964,801	37.24*
Taxes	64,712	24.47*	820,264	17.91*
Net income	$109,167	35.59*	$1,144,537	46.31*
Interest	169,201	1.35	1,581,694	5.28
Deficit	$60,031	......	$437,156	.....
II. Based on actual expenses:				
Operating revenue	$1,461,716	12.91	$12,697,710	11.84
Actual expenses	1,400,960	42.15	10,838,107	37.82
Balance	$60,756	80.34*	$1,859,603	46.72*
Obsolete property	40,000	......	378,000	.....
Net operating revenue	$20,756	92.29*	$1,481,603	51.67*
Non-operating income	11,468	16.80*	130,970	17.38*
Gross, less expenses	$32,225	88.61*	$1,612,574	49.98*
Taxes	64,712	24.47*	820,264	17.91*
Net income	$32,487*	......	$792,310	64.39*
Interest	169,201	1.35	1,581,694	5.28
Deficit	$201,688	......	$789,384	.....

* Decrease or deficit.

May Ask More in Washington

Since the present fare for Washington, D. C., expires on the first of January under the terms of the order of the Public Utilities Commission of the District of Columbia, it is necessary for the Washington Railway and Electric Company to apply to the Public Utilities Commission for a hearing. The Washington Railway & Electric Company's revenues have increased since the 8-cent cash fare, with four tickets for 30 cents, took effect last May.

The increase has not been sufficient to allow the railway as great an income as was estimated by the commission for this fare schedule, since there has been a larger falling off in traffic than was anticipated. The company states that it is impossible at this time to determine whether only a continuance of the present rate will be sought or whether the company will ask for a still higher fare.

During the month of September the company carried 6,768,363 passengers, a reduction of 10.4 per cent in the number as compared with the corresponding month last year. The revenues for the month were $507,110, an increase of 25 per cent above the gross income of the corresponding month of the previous year. This income apparently will not provide the revenue which the commission intended that the company should earn from its investment, but a sufficient period of operation under the new fare has not yet been experienced to make possible final decision as to proper fare rate to yield the authorized return.

Bus Regulation Demanded

By defeating at the election on Nov. 2 the initiative bill submitted by the local jitney operators the voters of Seattle, Wash., served notice on the jitney operators that unregulated operation of buses will not be longer tolerated. The strong interest taken by the people in the jitney question was shown in the heavy vote cast on this ordinance, and the fact that out of a total of 65,023 votes 40,612 votes were cast against it.

The majority of the votes cast in favor of the jitneys were cast by citizens who live within walking distance of the business center. A majority of citizens of many outlying precincts served by both the lines of the Seattle Municipal Railway and jitneys voted against the measure. The Ballard district, one of the most distant suburbs, showed its protest against the present railway service by voting in favor of the bill.

Transportation News Notes

Ten Cents in Dover.—The Portsmouth, Dover & York Street Railway, Dover, N. H., has been authorized to raise its cash fare from 7 to 10 cents.

Asks Six-Cent Fare.—The South New Orleans Light & Traction Company, Algiers, La., has applied to the Commission Consul of New Orleans for permission to raise its fare from 5 cents to 6 cents. The company's employees are demanding an advance in wages.

Seeks 8-Cent Fare. — The South Covington & Cincinnati Street Railway, Covington, Ky., is seeking permission from the city authorities of Newport, Ky., to raise its fare from 5 cents to 8 cents. The company's employees were recently awarded an increase in wages by a board of arbitration. The Newport City Commission has announced that it will consider no proposition looking to a fare increase until the company has consented to make certain improvements.

Asks 8 Cents in Peoria.—Stating that the increased costs of equipment and operation require it, the Peoria (Ill.) Railway has petitioned the State Public Utilities Commission for a permanent 8-cent fare. The company has been operating on a temporary 7-cent fare since June 3, when the Public Utilities Commission authorized a 7-cent fare as an emergency measure of relief. The company at that time had asked for a 10-cent cash fare. The city of Peoria is opposing this increase.

Seven Cents or Shutdown.—G. H. Garrison, superintendent of the Cortland County Traction Company, Cortland, N. Y., recently announced that owing to the increased price of coal, freight rates and general expenses, the company would have to demand a 7-cent fare after Dec. 1. The fares will be collected under the zone system, 7 cents for each zone. Tickets will be offered for sale at sixteen for $1 and eight for 50 cents, bringing the fare down to 6¼ cents for regular riders.

Asks Lower Fares on One-Man Cars.—Attorney R. A. Morton, Los Angeles, Cal., has petitioned the Railroad Commission of California asking that the one-man cars be discontinued or that the fare be reduced to 3 cents by the Los Angeles Railway. The petitioner explains that economies are certainly effected by the operation of one-man cars and that the public and not the company should receive such benefits, especially since the people, as the statement goes on to say, are subjected to all the inconveniences of the new car.

Rejects Nickel Fare Proposal.—G. T. Seely, general manager of the Youngstown (Ohio) Municipal Railway, has informed the Youngstown City Council that the company will be unable to accept a proposition made by the city authorities that the fare on the local lines be reduced to 5 cents, with a 5-cent charge for each transfer. The fare is now 9 cents. Mr. Seely states that the adoption of the plan suggested by the Council would result in a loss of from $20,000 to $40,000 a month.

Zones on Interurban.—A zone fare system was recently placed in effect on the line of the Northern Ohio Traction & Light Company, Akron, Ohio, between Akron, Kent and Ravenna. Under the new system the fare from Akron to Ravenna remains 30 cents, with a 5-cent fare in each zone. Fare collections are made as the passengers leave the cars on through trips. Within zones a pay-as-you-enter system is in operation. A similar zoning system will be installed on the company's line between North Canton and Massillon.

Safety Cars Approved.—The City Commission of Joliet, Ill., has authorized the Chicago & Joliet Electric Railway to use one-man safety cars on its local lines. The commission has repealed an ordinance requiring that each car carry a crew of two men. The "safeties" will not be installed for some time, since such equipment will require more double track and the provision of additional switches. It is reported that the company has placed orders for several cars of the one-man safety type.

Would Raise Fort Smith Fare.—D. C. Green, general manager of the Fort Smith Light & Traction Company, Fort Smith, Ark., recently announced that the company would shortly apply to the Arkansas Corporation Commission for authority to raise its fare from 6 cents to 7 cents. The 6-cent fare took effect Jan. 15. Mr. Green stated that a 7-cent rate would still fall short of paying a sufficient return on the investment. Since the present fare was installed the service has been improved and the wages of the carmen have been raised.

Rate Increase Suspended. — The Washington Public Service Commission has suspended the proposed tariff of the Puget Sound Electric Railway, Tacoma, increasing passenger fares between Tacoma and Seattle and intermediate points. The order made by the commission extends over a period of sixty days, at the end of which the commission will hold a hearing. A complaint signed by a large number of residents of the Duwamish Valley was received recently by the commission. The company proposes to increase the fares 10 per cent.

Rate Decision Deferred. — Chairman Charles B. Hill of the Public Service Commission, Second District, has reserved decision on the application of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., for permission to increase passenger fares from 3 cents to 3.6 cents a mile along its route, except in cities and incorporated villages. Lyman M. Bass, counsel for the company, recently informed the commission that the future operation of the road depended on the gaining of permission to increase the rates. Representatives of the towns of Fredonia and Hamburg appeared in opposition to the proposed schedule.

Fare Rejection Stands on Recount.—A recount of the votes cast in a special election on Oct. 4 at which the citizens of Duluth, Minn., passed on a proposition to allow the Duluth Street Railway to raise its fare from 5 cents to 6 cents shows that the proposition was rejected. The report of the inspectors filed with the court in the contest proceedings brought by the railway is as follows: For the increased fare, 7,381; against, 8,170; 258 balance in doubt. The official count as previously canvassed by the City Council was 7,563 for and 9,098 against. As a result of the rejection of the increase the company recently curtailed its service.

Immediate Relief Urged. — Counsel for the receivers of the Manhattan & Queens Traction Corporation, New York, N. Y., has asked the Public Service Commission for immediate action on the company's application for an increase in fare. The company filed a petition with the commission last August, and on Sept. 16 the receivers were notified to resume operation pending an investigation by the commission. Since that date, it is alleged, the corporation has increased its deficit by $10,000. Unless speedy relief is granted the road will be compelled to close down is the conclusion now arrived at by the company.

City Operation Opposed.—Operation by the city of Lowell, Mass., of the Lowell lines of the Eastern Massachusetts Street Railway, is opposed by the Trades and Labor Council of that city. The council at a recent meeting went on record as favoring a reduction in fare to 5 cents with a charge of 1 or 2 cents for a transfer, the responsibility for operation of the lines to be retained by the public trustees of the system. The plan for control of the district by the city called for a straight 5-cent fare with an assumption by the city of responsibility for any deficit which might be incurred. The cash fare is now 10 cents, no transfers being given.

Buses Barred in Muskegon.—The City Commission of Muskegon, Mich., has revoked all schedules and routes of the Muskegon Jitney Bus Corporation, a consolidation of local bus operators, and has named a special committee to make recommendations as to what course is to be taken in the settlement of the city's transportation problem. City Manager Ellison has been given authority to allow such buses as he deems necessary to operate, until the committee reports. Petitions bearing 241 names were presented asking that the buses be stopped from running on streets where the cars of the Muskegon Traction & Lighting Company now operate and also on the parallel streets.

Asks More in Raleigh.—An 8-cent cash fare is asked by the Carolina Power & Light Company, Raleigh, N. C., in an application filed recently with the North Carolina Corporation Commission. The company proposes to sell four tickets for 30 cents and twenty school tickets, with return trip, for $1.60. In June, 1918, the company filed an application for an increase in fare from 5 cents to 7 cents. After a full hearing the commission authorized a rate of 7 cents cash with four tickets for 25 cents and twenty school tickets with return fare for $1.40. In its present petition the company states that under these rates it finds itself unable to earn a fair return upon its property.

More Cars in Rush Hours.—Colonel Albert T. Perkins, general manager of the United Railways, St. Louis, Mo., has announced that the first of the new cars recommended by the Missouri Public Service Commission are being placed in service and that sixty will have been completed by Jan. 1, 1921. These sixty cars, he said, would reduce the early morning and evening crowding, since each car will have a capacity of about 150 persons and will make four trips in the peak-load hours. Fifty of the cars are being built by the United Railways shops and others by the American Car Company, which will have ten ready by Jan. 1. The St. Louis Car Company is building a number of others.

Service Curtailed in Utica.—Because the Common Council of the city of Utica has refused to take any notice of the pleas of the New York State Railways for an increase in fare the company has curtailed the service in order to continue operation. About seventy-five motormen and conductors were thrown out of work, the remaining workers choosing runs by right of seniority. The company had been collecting a 6-cent fare in the city for some time and lately maintained that this was not sufficient, claiming a loss of $1,000 daily. It maintains that an 8-cent fare is needed. The Common Council will meet again Nov. 18 and it is likely that the matter of an increase will come up again for discussion.

Trainmen Will Compete.—A series of safety contests has been arranged for trainmen of the Los Angeles (Cal.) Railway. The first accident-prevention campaign under the new plan was held Oct. 31. Trainmen are given choice of runs every three months and each safety contest will continue for corresponding periods. Competition will be between the five divisions of the system. The division with the fewest accidents in proportion to the daily car mileage will be declared the winner. A safety championship flag will be held for three months by the winning division and a smaller streamer for permanent possession will be awarded. For the first three months operators of one-man safety cars will not be included in the competition. Later a handicap system will be arranged to give the safety cars a place in the contest.

Personal Mention

Lewis Nixon Retires

New York Commissioner Will Resume Private Business—A. M. Barrett Appointed His Successor

Lewis Nixon, Public Service Commissioner for the First District of New York, resigned on Nov. 5 and sailed for Europe on the following day to be gone several months. Upon his return to the United States he will engage in private business. Alfred M. Barrett, Deputy Public Service Commissioner, has been appointed Mr. Nixon's successor for the remainder of the latter's unexpired term, ending May 8, 1924.

Before leaving for Europe Mr. Nixon declared that the adoption of service-at-cost franchise offered the best hope of a solution of the traction problem in New York City. He pointed out that if in the drawing of the dual contracts the corporations had secured inordinate advantages this was the opportunity to correct the unfairness. "While the people have been made to think that they pay 5 cents, an excess fare well above 5 cents is levied upon our taxpayers for all who travel, whether taxpayers or not, and this will continue for more than forty years and add more than $500,000,000 to the burden of taxation laid upon the people," said Mr. Nixon.

Regarding the operation of the lines by the city, Mr. Nixon said that "municipal ownership seems to be the only way to avoid resort to strike or violence in wage disputes, but there are so many pitfalls and difficulties due to the difference in point of view of office holders when entering and when leaving office that our people may be slow to adopt such a policy."

With reference to buses, Mr. Nixon said that their use in New York City would not lead to a betterment of transit conditions. In shaping the character and establishing fixed transit lines in outlying areas he thought that they had a place. "If we could build new and up-to-date electric street railway cars, with the best of tracks, permitting a speeding up of service, we should be much better off than with buses," said Mr. Nixon. Since this cannot be done, he declared, without a service-at-cost fare deterioration of the service must go on to the point where even a bus will be more efficient.

British Association Elects

George W. Holford, general manager of the Salford Corporation Tramways, was elected president of the Municipal Tramways Association of Great Britain, at the nineteenth annual conference of that body at Cardiff on Sept. 15 and 16. Mr. Holford succeeds Sir John Courtis, chairman of the Cardiff Tramways Committee. The proceedings of the conference were summarized in the issue of ELECTRIC RAILWAY JOURNAL for Nov. 6, page 980. Alderman R. Mayne, sheriff of Newcastle and chairman of the Newcastle Tramway Committee, was chosen vice-president.

Mr. Holford has been actively identified with the work of the association for the past fifteen years. More than a hundred companies, representing the municipally owned and operated tramways of the British Isles, are members of the organization. The privately-owned tramways are organized into the Tramways & Light Railways Association, of which Sir Arthur Stanley, G.B.E., M.V.O., is president.

As general manager of the Salford Corporation Tramways, Mr. Holford has direct charge of a system serving a community of approximately a quarter million persons. Salford is an industrial city near Manchester and separated from the latter city by the Irwell River. In addition to the urban trackage the tramway operates suburban lines.

W. H. Glenn to Resign

W. H. Glenn has tendered his resignation as vice-president of the Georgia Railway & Power Company, Atlanta, Ga., to become effective Dec. 1. Mr. Glenn will at that time take up the active duties of president of the Shippers' Compress Company, which operates cotton warehouses and compress plants in many cities of Georgia and Alabama. His successor has not yet been selected.

Mr. Glenn has been connected with the Georgia Railway & Power Company, and its predecessors for the past twenty-nine years. Shortly after his graduation from the Georgia Institute of Technology, he entered the employ of one of the constituent companies of the present system as a rod-man. He subsequently served for several years in the shops. Then came a promotion to purchasing agent. He was next appointed superintendent of track and roadway. In this position he had charge of most of the reconstruction work following the formation of the Georgia Railway & Electric Company, and worked out many of the problems of the physical property that necessarily followed the consolidation.

Twelve years ago Mr. Glenn was appointed general manager of the railway department of the Georgia Railway & Electric Company. Still later he was advanced to the position of vice-president and manager of railways of the Georgia Railway & Power Company. In 1904 he surrendered that title for that of vice-president and operating manager, with widely increased duties.

Mr. Potter in Charge

Made Manager of the Bridgeport Lines of the Connecticut Company, Succeeding Joseph S. Goodwin

J. B. Potter has been appointed manager of the Bridgeport Division of the Connecticut Company, New Haven, Conn., to succeed Joseph S. Goodwin, who resigned recently to become general manager of the Detroit (Mich.) Municipal Railway. Mr. Potter was formerly manager of the New York & Stamford Railway, Port Chester, N. Y. He resigned three years ago to join the firm of Sanderson & Porter, engineers, New York City.

As manager at Bridgeport, Mr. Potter will be in charge of the third largest division of the Connecticut Company. The Bridgeport unit operates in and connects the cities of Bridgeport, Stamford, Derby, Ansonia, and Norwalk, and a number of other communities, and comprises 105 miles of track. Service was resumed on the Bridgeport city lines on Sept. 20, after a suspension lasting eight weeks resulting from a failure of city authorities to take steps for the regulation of jitneys.

Mr. Potter's first work in the railway field was with the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., with which he was connected during 1897 and 1898. He then resigned to join the firm of Sanderson & Porter, as constructing engineer, building an electric railway from Central Village, Conn., to Webster, Mass. In November, 1900, he was appointed manager and treasurer of the Webster & Dudley Street Railway, Webster, Mass., continuing in this capacity for two years. He was then made manager of the Worcester & Webster Street Railway.

These properties remained under Mr. Potter's management until September, 1903, when they were leased to the Worcester & Connecticut Eastern Railway and Mr. Potter was made general superintendent. This company was afterward known as the Consolidated Railway, Putnam Lines. In August, 1905, in addition to his duties as general superintendent of the Putnam lines of the Consolidated Railway, he was made general superintendent of the Worcester & Southbridge Street Railway. Three years later he was appointed manager of the New York & Stamford Street Railway and the Stamford lines of the Consolidated Railway.

Leaves War Sales Office

E. C. Morse has resigned as director of sales of the War Department. Mr. Morse will return to civil life, but has as yet made no announcement as to the line of work which he will follow. Since the organization of the office of director of sales surplus stocks costing more than $1,685,000,000 have been sold to the public, transferred or authorized for transfer to other government departments. An average recovery of more than 63 per cent of the original cost of this material has been realized.

W. B. McKinley, United States Senator

President of the Illinois Traction System Wins Election by Large Majority—Long a Member of House of Representatives

Scoring an overwhelming victory over his Democratic rival, William B. McKinley, president of the Illinois Traction System, Peoria, Ill., was on Nov. 2 elected a United States Senator from Illinois. Mr. McKinley's nomination and election were a great personal triumph. He was the only opponent of the state political machine of Mayor Thompson of Chicago to win a nomination at the primary election held some time ago. The other successful candidates on the Republican ticket were all Thompson men. Mr. McKinley's election to the Senate comes as a climax of a long business and political career. He first entered public life in 1904, when he was chosen to represent the 19th Illinois district in the House of Representatives. Since that time he has served continuously as a Congressman and is now rounding out his seventh term as a member of the House. Mr. McKinley's work at Washington has been characterized by keen understanding of the needs not only of the immediate district which he has represented but also of the nation as a whole.

A MAN of many-sided nature, Mr. McKinley has demonstrated his ability as a leader. For a number of years he has been a deep student of economics and political questions and has made himself an authority on matters involving foreign relations. He has traveled widely, thus gaining an accurate conception of conditions in various parts of the world. Several years ago Mr. McKinley, accompanied by a party of friends, went on a trip around the globe, spending considerable time in the principal foreign cities.

AN INTERURBAN PIONEER

Mr. McKinley may justly be called the father of the Illinois Traction System. His vision and organizing genius were directly responsible for the formation and development of this great utility, now one of the largest and most important in the country. The foundations of the present system were laid in 1900, when Mr. McKinley purchased the traction system of Danville, Ill. Shortly thereafter he interested a group of Montreal capitalists in his plans, and bought up rights and franchises for lines in various places, which the original promoters had been unable to finance and to build.

In nine years the line in Danville had grown until it had become the Illinois Traction System, operating 500 miles of track, with its own bridge across the Mississippi River at St. Louis and its own terminal there in the heart of the city. The public utilities operated by the McKinley interests are included in two holding companies, of which Mr. McKinley is the president. These are the Illinois Traction System and the Western Railways & Light Company. These comprise besides the main interurban and local railway lines in Illinois, electric railway and lighting systems in Atchison, Topeka and Wichita, Kan., and in Oskaloosa, Iowa, and electric lighting and gas companies in a number of cities in Illinois and other states.

Mr. McKinley gained his first business success as an electric railway man. In 1884 he began to interest himself in public utility enterprises. He had already formed financial relations with capitalists in the East, and in that year he built the waterworks at Champaign. Shortly thereafter Mr. McKinley constructed an electric lighting plant in Champaign. He then bought the horse railway between Champaign and Urbana and equipped it with electricity. In 1890 he acquired the gas and electric plant in Defiance, Ohio, and built a street railway in that city. Two years later he bought the horse railway in Springfield, Ohio, and electrified it and did the same thing at Bay City, Mich.

At the time of the panic in 1893 Mr. McKinley had considerable money invested in farm mortgages in Kansas and disposed of most of the utilities which he had bought. Three years later, however, he re-entered the public utility field by building an 11-mile electric railway to Joliet. Within the next three years he bought and modernized the street railway lines in Quincy and Galesburg and constructed an interurban railway to Knoxville. These early experiences qualified him to undertake the work of building up the interurban system.

W. B. McKINLEY

Mr. McKinley was born in Petersburg, Ill., on Sept. 5, 1856. When he was two years old the family moved to Champaign, where his father became pastor of a small Presbyterian congregation. Champaign has since been the home and headquarters of the younger Mr. McKinley. At an early age he entered the University of Illinois, then known as the Illinois Industrial University. He gained his early business training as a clerk in a drug store, later working in a similar capacity in a real estate office. He then entered a bank in Champaign, where he advanced in a short time from bookkeeper to manager. He then became associated with his uncle, J. B. McKinley, in the farm loan business, branching out in 1884 to enter the utility field.

E. S. Davis has been elected vice-president of the Springfield (Vt.) Electric Railway.

C. J. Driscoll has been appointed assistant secretary of the Escanaba (Mich.) Traction Company.

E. T. Smith has been made master mechanic of the Savannah (Ga.) Electric Company. Mr. Smith was formerly master mechanic of the Tampa (Fla.) Electric Company.

Lewis A. Sargent has been appointed master mechanic of the Tampa (Fla.) Electric Company. Mr. Sargent was formerly purchasing agent of the Northern Texas Traction Company, Fort Worth, Texas.

John Duerr, superintendent of the Buffalo-Niagara Falls high-speed line of the International Railway, Buffalo, N. Y., has been transferred to the position of trainmaster of the Buffalo-Lockport Division of the International's interurban lines.

John F. Donovan, superintendent of the old Buffalo-Niagara Falls line of the International Railway, Buffalo, N. Y., has assumed charge of the high-speed line between the two cities and will henceforth serve as superintendent of both interurban divisions of the company.

R. J. Diefenbaugh has been appointed soliciting agent for the freight and traffic department of the Chicago & Interurban Traction Company, Chicago, Ill. This line, which connects Chicago and Kankakee, Ill., is now under the management of Britton I. Budd of the Chicago Elevated Railways.

Edwin R. Booth, who has been paymaster for the Northern Ohio Traction & Light Company, Akron, Ohio, since last January, has been appointed manager of Meyers' Lake Park, a resort owned by the company near Canton. Mr. Booth took charge of the park on Oct. 1. He was born in Springfield, Ill. He began work with this company in 1912, and, except for one year, has been in its service since that time. He began as treasurer of Meyers' Lake Park, and held that position until 1915, when he was placed in the payroll department in Akron. He also worked in other departments of the company, being assistant paymaster until called for military service in May, 1918.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER.

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Bronze Overhead-Line Products on the Decline

Easier Copper Market of Last Six Weeks Brings Reductions in Price of Ears, Splicers, Crossings, etc.

With the drop in price of copper which started about six weeks ago, there has been expectation in the trade that in a short time this would be reflected in easier prices of certain electrical materials. To date virtually the only effect has been found in slightly reduced prices on copper wire, rail bonds and certain kinds of brass and bronze overhead line material for electric railway work.

On some classes of rail bonds reduced prices went into effect the last of October, when discounts went to 20 per cent. On other types the prices are following to an extent the price of bare copper wire at the mill; this price is now quoted at from 17 to 17½ cents, while 22½ cents to 23 cents was the price at the end of September.

Brass and bronze overhead material, such as trolley ears, splicers, crossings, frogs, etc., produced by certain manufacturers, fell into line on Nov. 5 with a shade in prices of 4 points, amounting to about 6 per cent. At the same time the demand on all this material is merely nominal, just enough to continue maintenance.

Electrolytic copper is now quoted at from 14.75 to 15 cents a pound delivered; both producers and second hands are making sales at these figures. There was a buying spurt two weeks ago, but the demand at present is light. It is not expected that prices of copper products will respond to much of a decline until the high-priced copper stocks held by manufacturers have been pretty well exhausted.

Uneven Demand in Fare Register Market

Production Is Proceeding Favorably and Deliveries Are Fairly Good—Prices Hold Steady

Conditions of demand in the market for fare registers apparently vary considerably. On the one hand sales are held to be about average. Demand is rather spasmodic, usually on behalf of replacements and additions to new cars, with occasional orders for changing over the entire equipment of a road. On the other hand, this has been a banner year for business, according to one of the largest manufacturers in this line More registers have been sold by this company this year to date than ever before in the history of the business. The growing attention devoted to methods of fare collection on the part of electric railways and the great cost of paper where cash receipts are issued are held to be important factors.

Production in general is proceeding at a favorable rate. Malleable castings have been difficult to obtain in the past, but little trouble is experienced now with the raw material supply. Labor conditions are much improved too, as the greater supply permits inefficient workmen to be weeded out. In one case at least additions to plant are being made in order to increase the present output. Deliveries are made in reasonable time. In some cases the number of back orders mounted up to such an extent that new business, while still accepted, cannot be filled on some types of fare registers until next year. This condition does not seem to be representative, however. Stocks in general are maintained at a fairly good level. Manufacturers report being able to make deliveries on many types of registers from stock up to one week's time. On some varieties deliveries range as long as four months.

No recent price changes have occurred. Fare register prices have held at a fairly even level during the period of advancing costs, the maximum advance in a representative instance having been 50 per cent over pre-war quotations. For this reason no reductions apparently are contemplated in the near future. No cancellations have been received and customers are reported as paying their bills promptly.

Softening Prices Feature Iron and Steel Market

Unfilled Tonnage of U. S. Steel Corporation Declines—Cancellations Are Large and Buying Is Light in Face of Expected Readjustments—Coke Prices Drop

The current features of the iron and steel market are cancellations of orders, lighter demand and gradually softening prices in some lines. Unfilled tonnage on the books of the United States Steel Corporation on Oct. 31 is reported as amounting to 9,836,852 tons, a decrease of 537,952 tons from the figure of 10,374,804 tons on Sept. 30, 1920. The October total is the smallest excess reported since February, 1920. Few new orders are being received, buying at present being almost entirely of the "absolute necessity" class. The steel corporation's mills are still reported operating at about 80 per cent of capacity, however, but the business of independents is probably running closer to 50 or 60 per cent of capacity.

Prices of steel rails as quoted by the United States Steel Corporation have undergone no change, the quotation still being $45 for standard bessemer rails and $47 for open hearth. Orders are accepted, however, subject to price revision when quotations for 1921 are announced, which it is expected will not occur before early in December. The costs of independents' rails are given as considerably above this level, and according to the *Iron Age* a recent booking by an independent at $62.50 per gross ton is held to be a likely indication of the future price level in that quarter.

Orders for track bolts, spikes, etc., have fallen off to a considerable extent so that the scarcity, especially in bolts and nuts, that was reported some time ago has been relieved. Deliveries of spikes from Pittsburgh can be made as quickly as three weeks. Prices of wire and nails within the past week have eased off. Announcement is made of a reduction of $5 a ton in the base price of nails and wire by the Youngstown Sheet & Tube Company, which had previously held to a base of $4.50 per keg for wire nails, but is now quoting $4.25 per keg for nails and $3.75 on plain wire.

Steel-bar mills are now operating at a good rate as the result of accumulated orders. The only apparent softness existing in bars is on the larger sizes, which are said to be tending a little under the average of 3-cent base. Weakness prevails in the market for sheets and prices continue to slide. Black sheets are now easily obtainable at 6-cent base, which price independents have quoted, and as low as 4.75 cents has been made on blue annealed sheets. Independent mills generally quote 8 cents to 8.25 cents on galvanized, but some business has recently been placed as low as 7.50 cents.

Costs of fuel and labor have heretofore been strong factors in maintaining price levels in the iron and steel market. More talk is now heard of wage cuts, while coke prices have slumped noticeably. According to the same source of information as above Connellsville furnace coke for prompt delivery at oven declined from $9 per net ton to $8 within the last week or so, and foundry coke from $11 to $9 per net ton.

Orders for Badges More or Less Spasmodic

Trouble with Raw Material Supply—Deliveries in One to Two Months—Prices Steady

Demand for badges, while heavy on the whole, has been more or less spasmodic, according to one of the largest manufacturers furnishing this class of goods to electric railways. This is a natural result of the character of the business, it is said, as large orders are in great part the result of consolidations and changes in the organization of traction companies that necessitate complete changes in the existing badge equipment. Another factor that often accounts for orders of this material is the occurrence of strikes and labor troubles whereby employees fail to return badges used by them. The past year is reported as being fully up to the standard of other seasons as regards sales.

The raw material supply has been occasioning some trouble in this line, though this condition is now improving. German silver and celluloid have been difficult to obtain, though aluminum has been in good supply, according to a representative badge manufacturer. Deliveries are ranging from thirty to sixty days in this case, as the company has fallen behind on orders to that extent as a result of heavy demand, labor difficulties and trouble with raw material. No change in prices is anticipated, it is said.

Deliveries of Trolley Wire Are Improved

Buying Has Been Fairly Regular and Good Prospects for Future Business Are Seen—Prices Softening

Buying of bare trolley wire on the part of electric railways, while not extra heavy this year, has proceeded at a good substantial rate. At present the volume of demand is light, but such a condition normally prevails at this season until new extensions get under way in the spring. Furthermore, at least one large interest is not encouraging new business at present because of the unsettled condition of the copper market.

Reports on the foreign market differ. One view holds that foreign inquiries are picking up in line with a steady growth in demand abroad, but other interests are receiving fewer inquiries from that quarter. On the other hand, the market for composition trolley wire, both domestic and foreign, it is stated, has been stronger than any previous year.

PRODUCTION CONDITIONS IMPROVED

Production conditions as regards labor, raw material, etc., are much improved. Deliveries of trolley wire which last summer averaged six to eight weeks now range in the neighborhood of two to four weeks. Stocks of the finished product are not maintained, but the raw material surplus is good. Deliveries of composition trolley wire are reported slightly longer than the ordinary type, as back orders have piled up owing to the strong demand. On the general sizes about two to six weeks is quoted.

The condition reported last summer that some producers were drawing trolley wire stock to fine sizes and insulating it in order to cope with the overflow orders on insulated wire is no longer existent. The former delay occasioned by drawing processes has also been largely overcome. Reports vary as to whether railways are fairly well stocked with trolley wire to care for necessary repairs. It seems logical to believe that the statement that reserve stocks are small is more nearly correct, however, in view of the necessarily curtailed buying of many lines. A few cancellations have been received, but the number has not been large.

Prices have generally softened commensurate with the drop in the copper market. A representative producer is quoting trolley wire on a 19¾ cent base at present. The further trend of prices is dependent on the direction which copper takes, since the raw and the finished product in this case go largely hand in hand. Manufacturers express an optimistic view regarding the outlook for future business. Prospects for the further electrification of steam roads and hope of foreign markets opening up to a greater extent lend an encouraging tone.

Buying Active in Steam Railroad Field

Manner in Which the Railroads Have Come Into the Market Is Index of Expected Electric Railway Purchases in 1921—Fare Increases of Many Electric Lines Absorbed by Debts

The sales of one large electric manufacturing company to the steam railroad field for the month of October, 1920, were ten times what they were for the same month in 1919. This is a single criterion of how rapidly and materially the steam railways are getting back into the market for materials and supplies and equipment. This activity on their part has followed with remarkable closeness upon the nationwide rate increases granted by the Interstate Commerce Commission in late August and early September.

RATE INCREASES HELP BUYING

This is indicative of what may be expected in connection with the buying of the electric railways in a more gradual way. The outstanding difference between the two fields is that in the steam road field all of the railroads received the increases simultaneously, and all are beginning simultaneously to buy. In the electric railway field the increases in rate have been granted one at a time, here and there, all over the country, but the accumulation of rate increases should begin to manifest itself in buying activities more striking than heretofore this year, though the purchases made this year have placed many manufacturers in a position where deliveries have been very slow. This condition may, however, be more nearly ascribed to slow production than to the great volume of business.

Many electric railways which have received rate increases and have been operating under them for perhaps a number of months were involved in such heavy debt prior to the increase that the higher earnings were absorbed for long periods in paying off these active debts, so that these companies have not been in a position to be active in the market. Furthermore, at just this time of the year, a good many companies whose fiscal year is common with the calendar year cut down purchases to absolute necessities in order to improve the financial showing for the year. It is safe to believe, then, that early next year there will be a decided increase in the number of electric railways which will be getting back on their feet financially as the result of the continued higher earnings and there should follow a period of heavier buying in the electric railway field. It cannot be said that the buying during 1920 has been exceedingly poor, but it is believed that various improving conditions in the industry will conspire to make 1921 a far better year for the manufacturers. For the railways, with the prospect ahead of being able to buy, it means that the next few months will be a period of active planning. Equipment and material needs must necessarily be carefully checked and the necessary orders placed to insure the high standard of efficiency which has been the major premise for granting rate increases.

Rolling Stock

The Detroit (Mich.) Municipal Railway, through the Department of Street Railways of Detroit, and subject to the approval of the Common Council, has accepted the bid of the Osgood Bradley Car Company for twenty-five safety cars of the Birney type. Delivery of the cars is to be made in forty-five days it is reported.

The Topeka (Kan.) Railway expected delivery of eight new safety cars about the middle of this month. These were ordered nearly two years ago, but delivery has been awaiting approval of the $48,849 in equipment certificates, to pay for the cars, by the Court of Industrial Relations. This approval was granted by the court the latter part of October.

Twin City Rapid Transit Company, Minneapolis, Minn., announced in the Sept. 11 issue as changing over 300 cars to the front-entrance type, has placed two of the cars in operation on the Payne-Groveland line. A feature of the new construction of these cars is the replacing of the old hot water heaters by hot air heaters. The company is also starting to rebuild trailers for rush-hour service in St. Paul. The reconstructed cars will have a rear entrance and front exit.

Track and Roadway

Georgia Railway & Power Company, Atlanta, Ga.—The Georgia Railway & Power Company has anounced to the street committee its readiness to rebuild its tracks from the Broad Street viaduct to Alabama Street in Atlanta and also to pave between the tracks an area of approximately nine feet.

Louisville (Ky.) Railway.—The Louisville Railway is planning to install a loop in the near future at Audubon Park north of the Southern Railway crossing. Just as soon as the loop is completed city service will be extended to the new loop, which will be a great convenience to regular riders.

New York State Railways, Syracuse, N. Y.—The Public Service Commission, Second District, today granted permission and approval to the New York State Railways to construct a loop from its track in Milton Avenue in Solvay upon private property to the Semet Solvay Company's plant for the improvement of service for the employees of the Solvay companies. The village has granted the company the required franchise for operation and Commissioner Frank Irvine, the sitting commissioner, holds that public convenience and necessity require the construction of the loop and operation of the electric cars thereon.

Frontier Electric Railway, Buffalo, New York.—The Frontier Electric Railway, which proposes the construction of a new double track electric freight line between Buffalo and Niagara Falls, has petitioned the municipal authorities of North Tonawanda for permission to extend the time for commencing the construction of the line through that city. The time for starting the construction is set for Dec. 31, 1921. An extension of two years was sought. The proposed line would be operated by the Lackawanna and Pennsylvania Railroads. The right of way parallels the new high speed line of the International Railway Company, Buffalo.

Dallas (Tex.) Railway—The Dallas Railway must start immediately on its improvement program outlined by the city, or legal action will be taken against the company. J. F. Strickland has written the Mayor to the effect that the company was financially unable to reconstruct its tracks on South Lamar Street and it was also unsuccessful in its attempt to raise money for that purpose. The Mayor has replied that the Board of Commissioners will wait until Nov. 2 for assurances from the railway that the necessary improvements will be undertaken.

Power Houses, Shops and Buildings

Los Angeles (Cal.) Railway.—The Los Angeles Railway has just closed an order for two 1,000-kw. synchronous converters with 1,000-kva. oil-insulated self-cooling type transformers for operation on 50-cycle, 16,500-volt primary lines and to be automatically controlled. These units will supply energy at 600 volts to the direct-current trolley lines of this system. One of these units with a complete equipment by the General Electric Company will be located in the Garvanza District. The second unit, likewise automatically controlled, will be furnished by the Westinghouse Electric & Manufacturing Company and located in the Vernon District. The Los Angeles Railway power supply comprises ten substations, manually controlled, totaling 26,000 kw.; the largest single station is rated at 6,000 kw. Most of the units are induction motor-generator sets although four 1,500-kw. synchronous converters were installed recently.

Trade Notes

The Pierce Fuse Corporation of Buffalo, N. Y., announces the appointment of Emory M. Coffin as sales manager, succeeding P. S. Klees.

The Shanklin Equipment Company, Inc., Springfield, Mass., which recently developed an automatic transfer issuing machine, announces that it has installed this equipment on the one-man cars of the Maple Street lines of Springfield and also on the two-man cars of the Walnut Street line. Installation in other cities, it is stated, will begin this month.

Franklin P. Wilds has severed his connection with the Irvington Varnish & Insulator Company to become vice-president of the Standard Insulator Company at Rutherford, N. J., it is announced. The latter company manufactures varnished cambric, oiled paper, oiled silk and various kinds of varnished treated papers. Mr. Wilds was formerly with the Mica Insulator Company, the Linonite Company, Keene Mica Products Company and for the past ten years with the Irvington Varnish & Insulator Company.

The American Gear Manufacturers' Association held its fall meeting at Mohonk Lake, New York, on Oct. 27, 28 and 29. About 100 members of the association were present, representing about eighty-five of the largest gear manufacturing companies of the country. The keynote of the meeting was standardization. P. G. Agnew, secretary of the American engineering standards committee, spoke on "Standardization from the Point of View of the American Engineering Standards Committee"; Calvin W. Rice, secretary of the American Society of Mechanical Engineers, gave an interesting talk on the subject of "Standardization"; C. L. Collens, II, president of the Reliance Electric & Engineering Company and past-president of the Electric Power Club, made a helpful address on "Industry Organization," and Christopher Haigh of the General Electric Company presented the "Machine Rate Method of Distributing Expense." The spring meeting of the association will be held at St. Louis.

George N. Brown, until recently electrical engineer of the New York State Railways, Syracuse-Utica lines, on Nov. 1 took up his new work as district manager at the New York office of the Pittsburgh Transformer Company. Mr. Brown came directly to his new position from the engineering department of the Brooklyn Edison Company. He is a graduate of the Cornell University course in electrical engineering, immediately thereafter beginning railway work as inspector of car equipment with the Utica & Mohawk Valley Railway. In the fall of 1908 he was transferred to Syracuse as car inspector on the Oneida Railway, but returned to Utica after a year as assistant to H. S. Williams, electrical engineer of the Utica & Mohawk Valley Railway. In November, 1910, he became connected with the Boston & Maine Railroad and took part in the Hoosac tunnel electrification, afterward acting as switchboard operator in the North Adams power plant. In May, 1912, Mr. Brown became assistant engineer of the three lines which now form the Syracuse-Utica division of the New York State Railways. He was later made electrical engineer of these lines.

New Advertising Literature

Car Heaters.—Holden & White, Inc., Chicago, Ill., has published an illustrated folder on its line of electric car heaters with Cutler-Hammer heating units.

Car Plant.—The J. G. Brill Company, Philadelphia, Pa., is distributing copies of the pictorial section of the Philadelphia *Public Ledger* for Oct. 17, which contains two pages of interesting pictures of the Brill plant as part of a series appearing each Sunday on "Great Industries That Have Made Philadelphia Great."

Engineering Service.—Ford, Bacon & Davis, engineers, 115 Broadway, New York City, are distributing pamphlet 29, dated Oct. 15, on "The New Jersey Valuation Law," which contains editorial opinions of the New Jersey law calling for valuation of street railway properties in the state, under which the company has been retained to do the work of appraising.

Employee Relations.— Westinghouse Air Brake Company, Wilmerding, Pa., is distributing publication 9,044, a sixty-one page illustrated brochure entitled "The Air Brake Family," which describes the industrial, social and welfare activities of the company.

Back From the Convention

G. M.: Well, what did you find out about those hand brakes?

Supt. Transportation: I talked with as many of the operating men as I met and they can't see anything but Peacocks, say they're light, easy to apply, and have stopped the heaviest cars in time to prevent accidents on curves and grades.

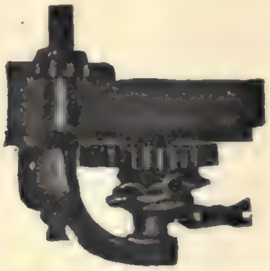
G. M.: Do you think we can manage without them until this fare increase that's up, goes through?

Supt. Transportation: Yes, I suppose so but we're taking a mighty big risk if we do. We surely do need those brakes and we ought to be putting 'em on right now before cold weather sets in.

G. M.: All right, get in your requisition right away. I hate to spend even a cent now but I'm afraid to be without them. What one are you going to specify?

Supt. Transportation: Why, the Peacock Staffless, that's the one that only takes up six inches of platform space.

G. M.: Good, and we'll manage it somehow.



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S. W. Bagnall, Secretary.

HAVE YOU SOMETHING TO SELL?
The "SEARCHLIGHT" Section can help you find a buyer for it.
For every business want *"Think SEARCHLIGHT First"*
0111

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
Security Building, St. Louis, Mo.

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and Mechanical Testing
80th Street and East End Ave., New York, N. Y.

THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK
DETECTIVES
Street Railway Inspection
131 State St. BOSTON

Scofield Engineering Co.
POWER STATIONS
HYDRAULIC DEVELOPMENTS
Consulting Engineers
PHILADELPHIA, PA.
GAS WORKS
ELECTRIC RAILWAYS

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Collier Service

Standards are being kept

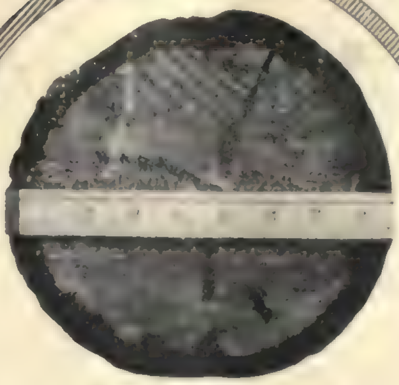
Regardless of the great increases in the cost of materials, artwork, printing, labor and other items, users of Collier Service know that its standards are not only being kept, but even surpassed.

No deterioration is permitted in the quality of the car-card stock or printing; nor a lowering of the artistic standards and originality that have made car-card advertising a respected medium with the shrewdest advertisers of America.

And this adherence to a standard of excellence set by ourselves is matched by faithful adherence to our agreements to pay a fixed sum per month promptly to our electric railway clients, with no attempt whatever to claim indulgence for unforeseen changes in economic conditions.

Barron G. Collier
INCORPORATED

Candler Building, New York



Cross-Section Picked At
Random Showing the Full Penetration

Guaranteed ½ Inch Uniform Penetration

POLE-BUYERS for years have wanted a Butt-Treating process that would guarantee a uniform depth of penetration of the preservative, in order that the poles would endure for the maximum number of years.

With the P & H Guaranteed Penetration Process the practical attainment of this ideal has been realized. For the first time in the history of the pole industry users are offered a butt-treating process carrying a guaranteed result,—a warranted ½ inch uniform penetration of the preservative throughout the ground line area.

Every purchaser of poles knows what a radical departure this process is from old methods, and what this new process means in insuring the length of life of the poles.

The P & H process is the only one that guarantees the results. Back of the guarantee is the reputation of Page & Hill Co., foremost in the Butt-Treatment of poles.

Insist on the P & H Guaranteed Penetration Process.

Write for Full Particulars.

PAGE & HILL CO.
Minneapolis, Minn.

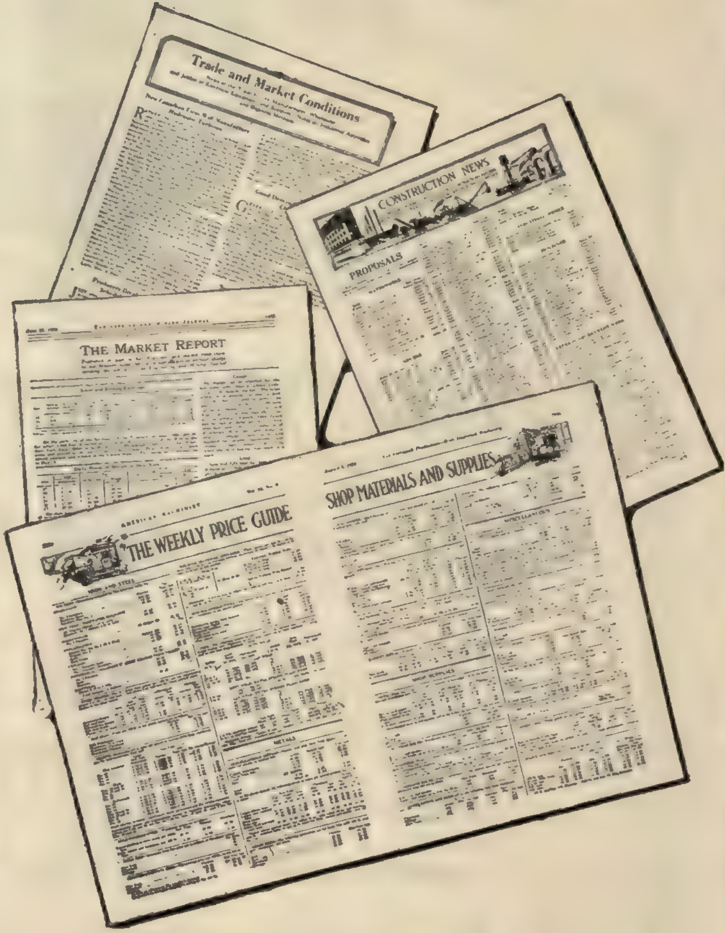
BRANCH OFFICES:
Times Bldg., NEW YORK, N. Y.
717 Bryant Bldg., KANSAS CITY, MO.
19 So. LaSalle, CHICAGO, ILL.
1111 Carter Bldg., HOUSTON, TEXAS
311 Sumpter Bldg., DALLAS, TEXAS
1416 Starks Bldg., LOUISVILLE, KY.

Originators of the P & H Guaranteed Penetration Process. Producers, manufacturers, and foremost in the Butt-Treatment of poles.

Butt-Treated
BY
PAGE & HILL CO.
1920
GUARANTEED
One-Half Inch
PENETRATION

This disc countersunk on the butt-end of every pole Butt-Treated by the P & H Guaranteed Penetration Process is your assurance of one-half inch penetration.

How to Think Straight about Business


Trade and Market Conditions

CONSTRUCTION NEWS

PROPOSALS

THE MARKET REPORT

THE WEEKLY PRICE GUIDE

SHOP MATERIALS AND SUPPLIES

WHAT is going to happen tomorrow is the vital thing that affects what business men are doing today. There are five sets of facts on which business men make up their minds.

First—*Credit Conditions.* The average man in business gets this information from the banker personally, from Federal Reserve reports, from Bank Reviews, from his business paper.

Second—*The Labor Market.* Facts with regard to the labor market come from the newspapers, from the business papers in the basic trades.

Third—*Transportation.* He looks for these facts in the newspapers, in his own business paper, and in specialized business papers.

Fourth—*Conditions of His Own Market.* These conditions he judges from his own salesmen's reports, from the business papers.

Fifth—*His Own Raw Material Machinery,* and *Equipment Conditions.* Business Papers Only.

From six to eight pages of the fields of engineering and industry covered by the eleven McGraw-Hill publications are devoted each week to these basic facts.

Special editors and a special department in the Company called the Business News Department, organized with a far-flung chain of correspondence, provide verified news. The men in this work are in intimate personal contact with the sources of information. The Engineering and Mining Journal reports, for example, are quoted as a basis for making contracts for all metals and minerals. The Engineering News-Record's Construction News is a basis for contracts running into millions of dollars each week.

This vital contact of the business press with the industries they serve is the special reason why business men now are reading the future by studying the business papers.

Power
Coal Age
American Machinist
Electrical World
Electrical Merchandising
Journal of Electricity
Electric Railway Journal
Engineering News-Record
Ingenieria Internacional
Engineering and Mining Journal
Chemical and Metallurgical Engineering

McGraw-Hill Company, Inc.
Tenth Avenue at 36th Street
New York City

The 11 McGraw-Hill Publications

—how individual lubricating service reduces lubricating costs . . . . .

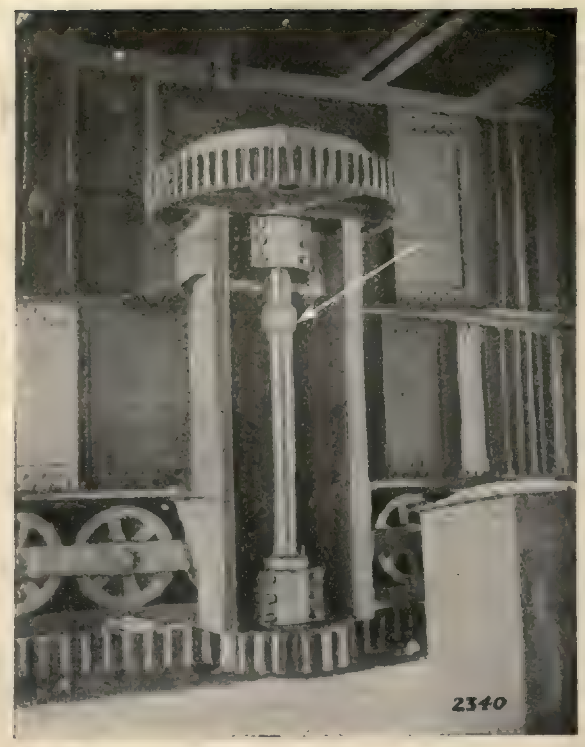
LUBRICATION—NOT OIL is necessary to get results.

TULC is lubrication, and when it shows a decrease in cost of labor, upkeep of motor maintenance, etc.—it is **ECONOMY**.

We have many instances where TULC has shown large savings—but convince yourself by testing it under your own cars.

The Universal Lubricating Co.
Cleveland, Ohio
Factory: Sweeney Ave. **Office: Schofield Bldg.**

TULC—Universal Service



Thermit weld on drawbridge turning shaft

North Chelsea drawbridge, turning shaft of which was welded

THERMIT WELDING

For Emergency Repairs

The left illustration shows a Thermit Weld made in one day on a broken 6-in. diameter main turning shaft of the North Chelsea, Mass., Drawbridge, which prevented a serious traffic tie-up of 600 cars per day which the Eastern Massachusetts Railway operates over it. The shaft was replaced in operation after welding as strong if not stronger than ever.

Thermit Welding may be applied to many other repairs on heavy broken steel sections used by Electric Railways, such as truck frames, motor cases, crank shafts, etc., reclaiming them as good as new, as well as for its widespread use in eliminating the rail joint and paved track and for constructing at low cost Thermit Welded frogs and crossings.

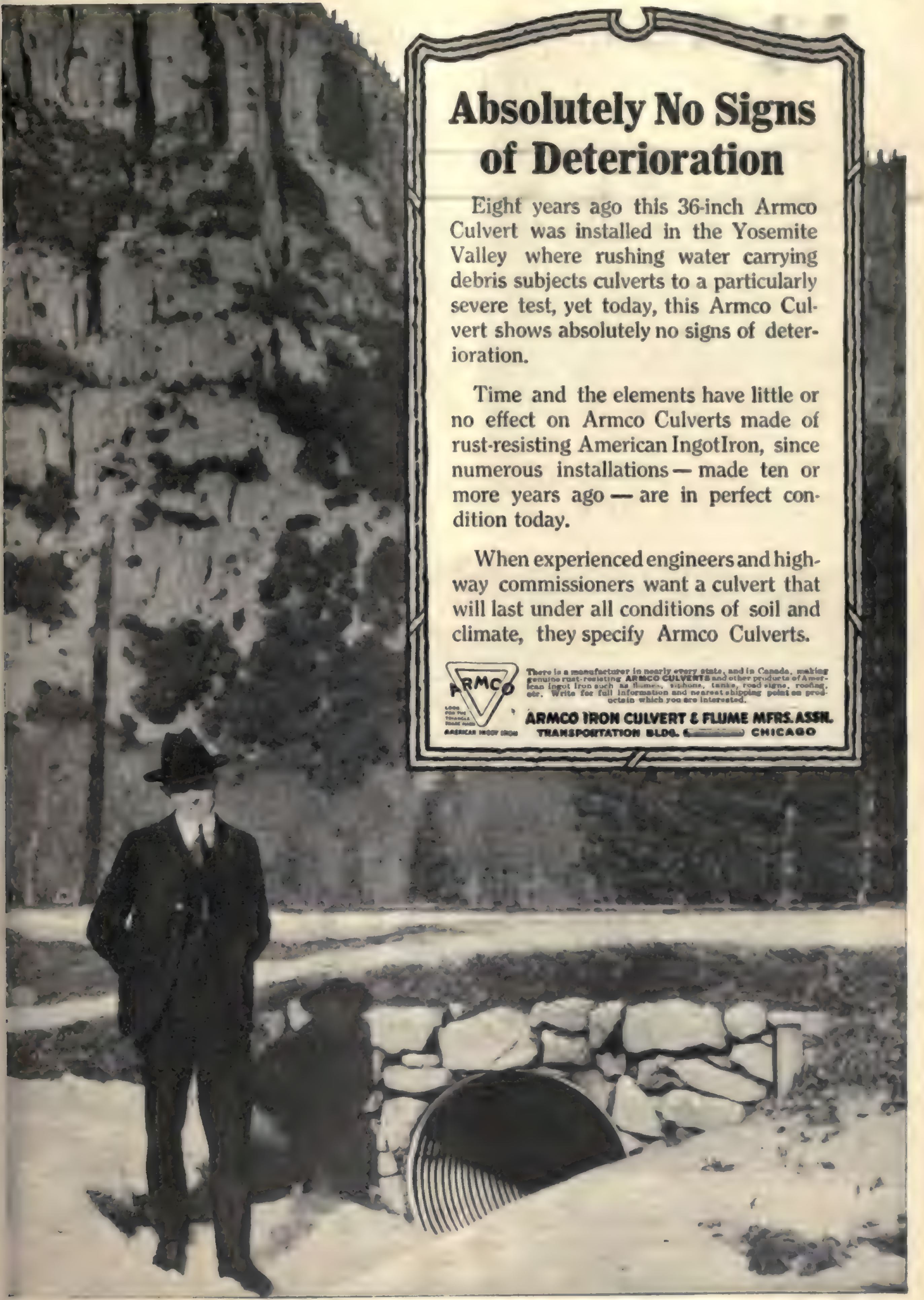
Send for our new Rail Welding Pamphlet 39.

Metal & Thermit Corporation

SERVICE STRENGTH THERMIT WELDING ECONOMY

120 Broadway New York

Pittsburgh Chicago Boston San Francisco Toronto



Absolutely No Signs of Deterioration

Eight years ago this 36-inch Armco Culvert was installed in the Yosemite Valley where rushing water carrying debris subjects culverts to a particularly severe test, yet today, this Armco Culvert shows absolutely no signs of deterioration.

Time and the elements have little or no effect on Armco Culverts made of rust-resisting American IngotIron, since numerous installations — made ten or more years ago — are in perfect condition today.

When experienced engineers and highway commissioners want a culvert that will last under all conditions of soil and climate, they specify Armco Culverts.

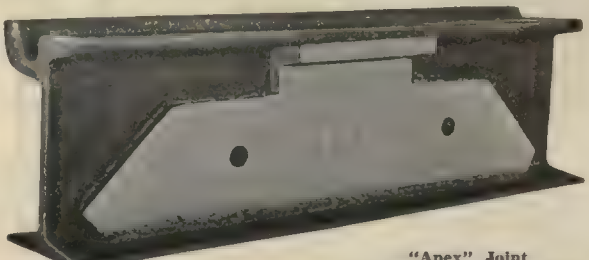
There is a manufacturer in nearly every state, and in Canada, making genuine rust-resisting ARMCO CULVERTS and other products of American Ingot Iron such as flumes, siphons, tanks, road signs, roofing, etc. Write for full information and nearest shipping point on products in which you are interested.

ARMCO IRON CULVERT & FLUME MFRS. ASSN.
TRANSPORTATION BLDG. [illegible] CHICAGO

Now is the time to build up worn track with the

Indianapolis Portable Patented Electric Welder

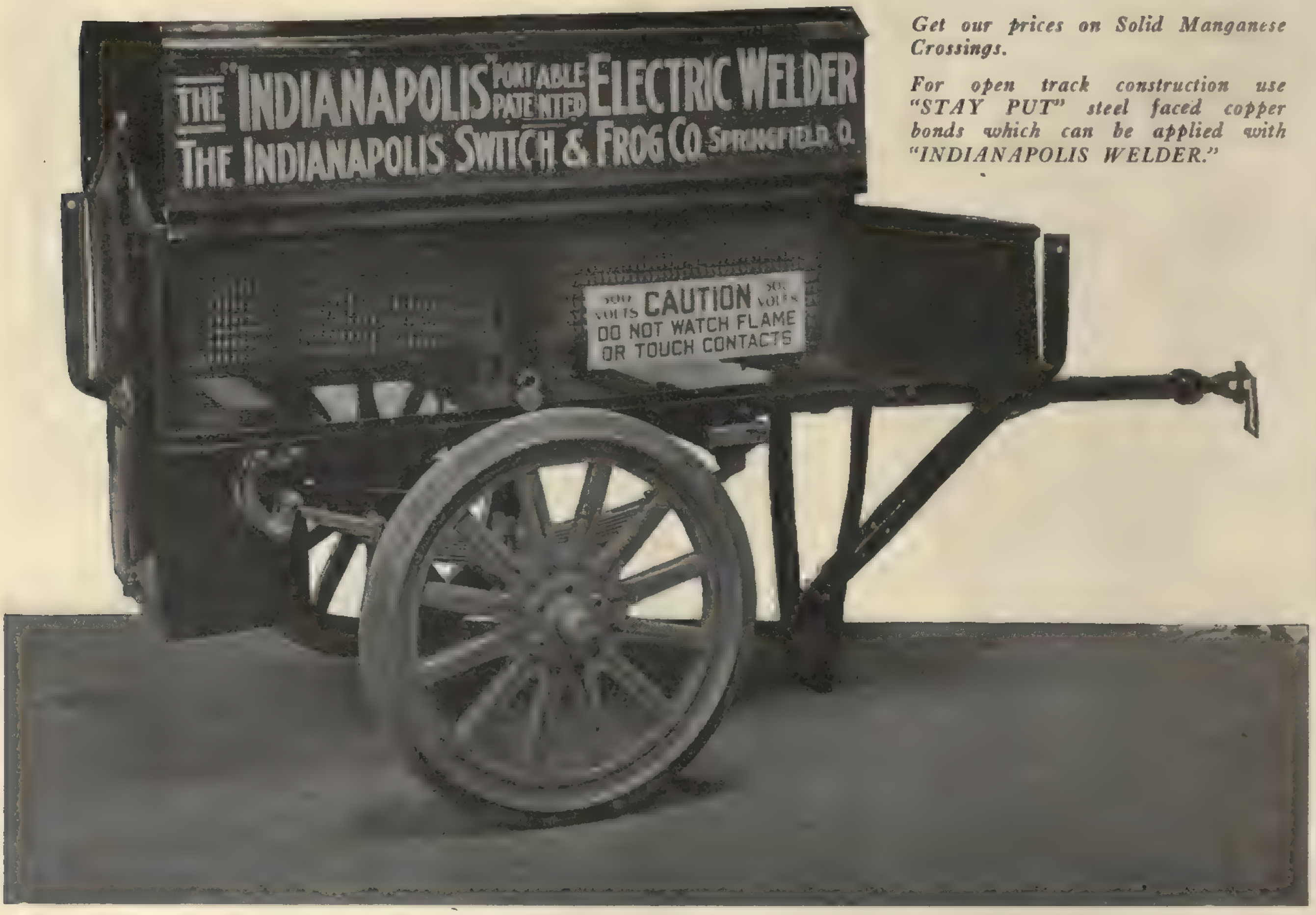
Now—before freezing weather sets in and handicaps you—is the time to reclaim or utilize worn rails and badly damaged special work. Now is the time to build up low joints, hard center frogs and broken switch pieces. Now is the time to secure and use the equipment now standard on 90% of the larger railways—the Indianapolis Electric Welder. Certainly this equipment would not have reached a position like that on anything less than *sheer merit.*



"Apex" Joint
for Guard and Girder Rail

Get our prices on Solid Manganese Crossings.

For open track construction use "STAY PUT" steel faced copper bonds which can be applied with "INDIANAPOLIS WELDER."


THE "INDIANAPOLIS" PORTABLE PATENTED ELECTRIC WELDER
THE INDIANAPOLIS SWITCH & FROG CO. SPRINGFIELD, O.
CAUTION
DO NOT WATCH FLAME
OR TOUCH CONTACTS

INDIANAPOLIS SWITCH & FROG CO.
SPRINGFIELD, OHIO

PUBLIC SERVICE RAILWAY

orders

H-B LIFE GUARDS

for its 200 New Safety Cars

This action is a direct result of the splendid records made by H-B Life Guards in many large cities all over the United States.

H-B Life Guards are one of the important factors that make the safety car safe.

Front end accidents cannot always be avoided, but by equipping your cars with H-B Life Guards you practically eliminate the fatal accidents and the costly claims that invariably follow.

H-B Life Guards on your new cars and also on your old cars will guarantee you against loss in settling claims for damages.

A line written to us now might save you much money.

Write today.

The Consolidated Car Fender Co., Providence, R. I.

General Sales Agent

Wendell & MacDuffie Co.

61 Broadway, N. Y.

Le Carbone Carbon Brushes

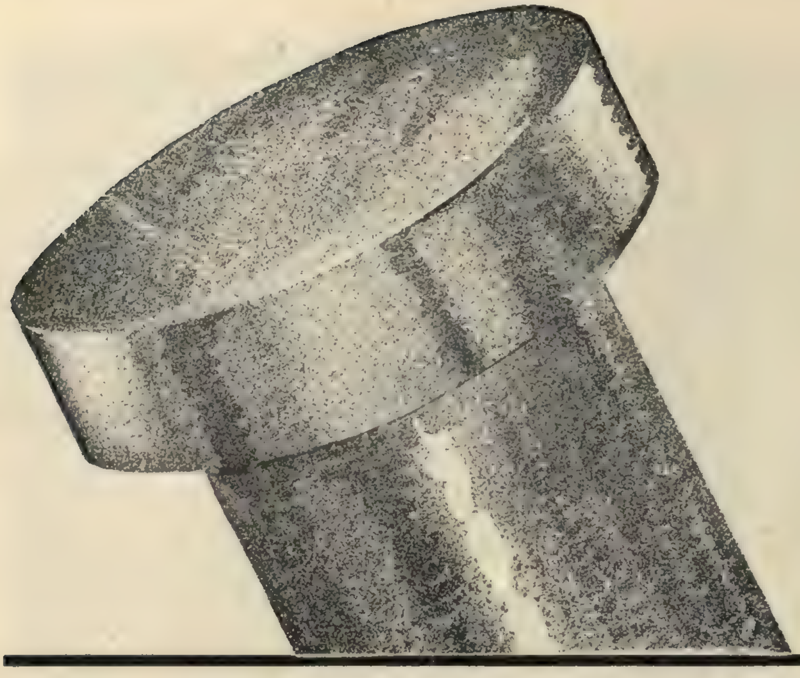
They are Uniform in Quality.

They talk for themselves.

W. J. JEANDRON
227 Fulton Street
New York City

Pittsburgh Office:
636 Wabash Building

Canadian Distributors:
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto



Analyze These, Please, on Your System, Then

BOYERIZE Your Brake Rigging

1—Collisions of cars
2—Collisions of cars with persons
3—Collisions of cars with animals
4—Collisions of cars with vehicles
5—Cars derailed
6—Lost control of car

No. 1 implies damage to your property and injury to your customers.

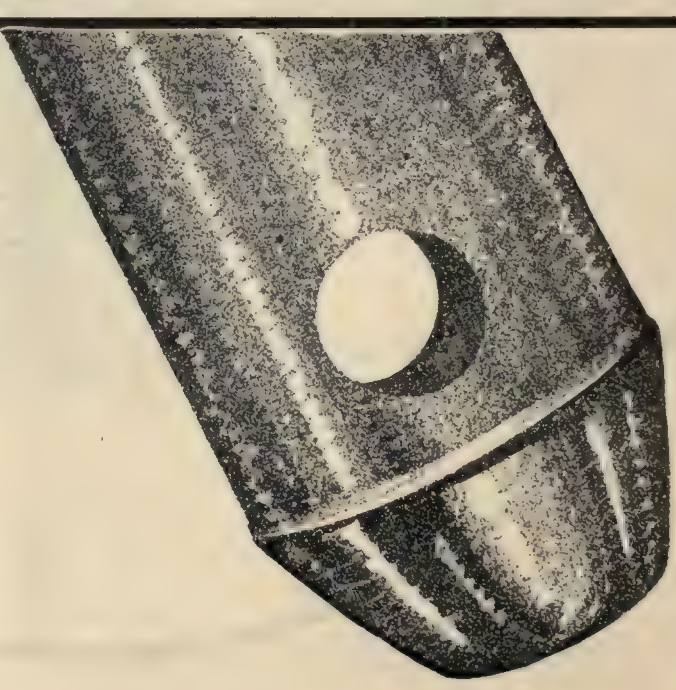
No. 2 implies injury to pedestrians, many of whom ought to be attracted to become your customers.

No. 3 implies injury to animals. They're growing scarcer, but their owners rate 'em at a high price when they're hurt.

No. 4 implies damage to anything from a Ford to a Rolls-Royce. Surprising, isn't it, that a bumped auto was either new or almost new and that you're asked to settle accordingly?

Nos. 5 and 6 imply that 'most anything could happen when the car doesn't stop where the motorman thought it would.

To make your cars stop before they can cause accident calls not only for good brakes but absolutely dependable brake rigging. Boyerized pins and bushings will make your brake rigging dependable for many, many more miles than to-day.



To Boyerize means:

Boyerized Brake Lever Pins and Bushings

Boyerized Brake Hangers

Boyerized Wearing Plates
between the Bolster and Bolster Carrier

Boyerized Wearing Plates between the
Pedestal Straps and the Journal Box

Bemis Car Truck Company

Electric Railway Supplies

Springfield, Mass.

1 out of every 10 is a technical man

ONE out of every ten men enrolled for the Alexander Hamilton Institute's Modern Business Course and Service is a technical man.

More than 12,000 such men, including graduates of every leading technical institution, as well as superintendents, foremen, and others whose previous education had been gained in the school of practical experience, have tested the Institute's training in their own experience and proved its value.

Why should the percentage be so large? Why is the Alexander Hamilton Institute in a position to render a special and peculiar service to technical men—*to you?*

You have only to look around you in business to learn the answer. *Departments of business are headed by technical experts*; *but businesses are headed by men who have added to their technical training a knowledge of the fundamentals of organization, finance, accounting, sales and administration.*

To add that all-round knowledge of business to the equipment of men is the business of the Institute. Its product is self-confidence and judgment based on a mastery of fundamental principles. Added income follows inevitably, for the demand for such men is always in excess of the supply.

A technical man's $7,000 hour

A COLLEGE-TRAINED engineer employed as head of the engineering department in a large concern in Springfield, Mass., at $3,000 a year, applied to the president of a New York company who was seeking a manager for its interests in the Philippines.

As an engineer his ability was not questioned. But the president doubted his capacity to deal with the great variety of business problems with which the position would be confronted.

* * * *

"Test me," he said to the president. "Send out to your files and bring in questions of the sort I will be expected to handle. For a year I have been fitting myself for an opportunity like this under the guidance of the Alexander Hamilton Institute.

"I have studied the fundamentals of selling and advertising, of costs and accounting, of traffic, foreign trade, and corporation finance. Give me a chance to show what I have learned."

He met the test and the contract was signed at $10,000 a year. In a single hour his income had advanced $7,000.

A chemist enrolled while he was getting $2,500 a year. Now he is general manager of his company and is paid $10,000. "Business policy shaped by your Course," he writes.

"I was just beginning to feel the handicap of a purely engineering education," writes a man who enrolled as a designing and sales engineer at $3,900 a year. Today as manager of his company at $10,000 a year, he says, "the Course prepared me to absorb readily and apply the lessons gleaned from the efforts of others with whom I came into contact."

Could you meet the test if your chance were to come tomorrow?

HAVE you reached your limit? Are you as far advanced as your special technical training will carry you? Could you, if your company were looking for a general manager, look the president in the eye and challenge him to a test of your knowledge of general business practice?

To technical men who have acquired the knowledge essential to the higher executive positions, opportunity constantly beckons.

The men behind the Institute

AS for the men behind the Institute they represent the highest educational and business authority of the day.

The Advisory Council consists of John Hays Hammond, the eminent engineer; Frank A. Vanderlip, the financier; Gen. Coleman duPont, the well-known business executive; Jeremiah W. Jenks, the statistician and economist; and Joseph French Johnson, Dean of the New York University School of Commerce.

"Forging Ahead in Business"

THE facts about the Institute are printed in a 116-page book, entitled, "Forging Ahead in Business." It is a book you will be glad to have in your Library, and it will be sent to you without obligation. Send for your copy today.

Alexander Hamilton Institute
911 Astor Place, New York City
Canadian Address, C.P.R. Bldg., Toronto

Send me "Forging Ahead in Business" which I may keep without obligation.

Name ....
Print here

Business Address ....

....

Business Position ....

Copyright 1920, Alexander Hamilton Institute

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

S BRAND

"The 'Standard' Brand on your material is an assurance of eventual economy."

S BRAND

STANDARD STEEL WORKS CO.

GENERAL OFFICES:

500 NORTH BROAD ST., PHILADELPHIA, PA.

CHICAGO
ST. LOUIS
HAVANA, CUBA
ST. PAUL

RICHMOND
SAN FRANCISCO
NEW YORK
HOUSTON

MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

Nandi

Over in India, Nandi the bull is the Hindu god Shivas special means of transport. More than that, he is also the god's chamberlain and chief musician—a three-fold job which, take it from the picture, is no sinecure.

Many centuries ago, when Shiva first put Nandi into commission, the folks over in India took bull riding quite seriously for a while. Then the suspicion began to grow that Nandi was mostly a noise spreader; after the passing of the first hundred years they began to experience a humorous feeling every time Shiva rode drummingly by—"Ayah," they would shout laughingly, "It's only Nandi again, nothing but bull!"

Every time a vendor of carbon brushes claims he can eliminate your brush ills by permitting you to choose from a catalog of what-nots—remember Nandi, he's still being ridden.

Then send for a Morganite engineer who will prescribe a Morganite brush which is exactly suited to the conditions under which your machines operate.

If the prescription does not cut your brush bills—*we lose.* If it does—*you gain.* Can anything be more fair than that?

Morganite Brush Co., Inc.

Main Office and Factory: 519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Lewis & Roth, 13th and Wood Sts., Philadelphia

Electrical Engineering & Mfg. Co.,
First National Bank Bldg., Pittsburgh

R. W. Lillie Corporation,
176 Federal St., Boston, Mass.

W. R. Hendey Co., Hoge Bldg., Seattle.

Herzog Electric & Engineering Co., 150 Steuart St.,
San Francisco

Charles Farnham, I. W. Hellman Bldg.
Los Angeles

Railway & Power Engineering Corporation, Ltd.,
131 Eastern Ave., Toronto, Ontario, Canada

The Reasons Why

Rolled and Forged Circular Sections

made by our special methods should be specified

Told in Five Chapters

CHAPTER III

An Unusual Machine

The actual shaping of our circular sections is done on a machine which at once rolls and forges the block into the rough blank or section.

This immense machine, exerting a pressure of three million pounds, is made up of two parts, viz:—an hydraulic ram on the end of which is a die that is free to rotate, and a second die mounted on the end of a shaft placed at an angle to the center line of the ram and driven by an electric motor. In operation, the machine at once presses or forges and rolls the block of metal which is placed between the dies.

TURBINE BUCKET WHEEL

ROUGH TURNED GEAR BLANK

STREET CAR WHEEL

AUTOMOBILE FLYWHEEL BLANK

SHAFT COUPLING

Uniform Circular Sections

of many kinds can be made by our special methods. A few of these are listed below:

Automobile Flywheel Blanks
Car Wheels
Crane Track Wheels
Gear Blanks
Industrial Wheels
Shaft Coupling Blanks
Turbine Discs

Write for detailed information.
Also watch for next week's advertisement.

Midvale Steel and Ordnance Company
Cambria Steel Company

General Sales Office, Widener Building, Philadelphia, Pa.

District Sales Offices
Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia
Pittsburgh, San Francisco, Salt Lake City, Seattle, St. Louis

Sole Export Representatives
Consolidated Steel Corporation, 165 Broadway, New York
All export inquiries should be sent to this address

39-1

THE

ERICO

Portable
Rail Bonding and
Arc Welding
Apparatus

The simplest and best apparatus for track and return circuit maintenance.

It has two distinct uses

1. Rail bonding—welding the copper to the rail.
2. Arc welding — either along track or in the shop, for building up worn rails, switch points, frogs and crossings and for shop repairing, such as worn axles, wheels and shafts and for repairing broken pieces.

Write us for complete information and prices.

Electric Railway
Improvement Co.
Cleveland, Ohio

BATES
STEEL POLES
are IDEAL for
ELECTRIC RAILWAYS
TRANSMISSION LINES
STREET LIGHTING
SIGNAL SYSTEMS

Bates One-Piece Steel Poles possess in the *Highest Degree* the following requisites of

MODERN STEEL POLES:
SAFETY
RELIABILITY
PERMANENCY
LOW FIRST COST
SCIENTIFIC DESIGN
ARTISTIC APPEARANCE
LOW MAINTENANCE COST

Large Stocks of Standard Poles are always available for IMMEDIATE SHIPMENT

Our New 1921 TREATISE AND HANDBOOK sent upon request.

Bates Expanded Steel Truss Co.

208 South La Salle Street
CHICAGO, ILLINOIS

Giant Strain Insulator

made to be neglected

YOU have other things to do than be bothered with replacing broken strain insulators. That's why we make the Giant Strain Insulator so good you can put it in service and forget it.

For instance, we use Mica Discs between metal parts that keep Giant Strain Insulators *insulators* long after the ordinary commercial kinds are scrapped.

And if it's strength plus permanent insulation you're after, let us give you more complete information about the Giant Strain Insulator.

JOHNS-MANVILLE
Incorporated
Madison Avenue at 41st St.
New York City
10 Factories—Branches in 64
Large Cities
For Canada
CANADIAN
JOHNS-MANVILLE CO., Ltd.
Toronto

JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT
Through—
Asbestos
and its allied products
JOHNS-MANVILLE
Serves in Conservation
Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products

JOHNS-MANVILLE
ELECTRICAL MATERIALS

WHEN YOU SPECIFY LUMBER FOR

CROSSARMS, TIES,

FENCING, TRUNKING AND CAPPING or any of the hundred and one things that a railway uses lumber for, just bear this important fact in mind:

The cost of the material is generally a small item as compared with the cost of labor for installing it.

When you specify and use ALL-HEART

CYPRESS
"THE WOOD ETERNAL"

for such purposes you know that it is going to give service for a long time, and that you are *not* going to be up against a continuous big *labor cost* for renewals and replacements.

Of course even Cypress may eventually have to be replaced. Nothing lasts quite forever. But in the long service life you get from Cypress you will have *saved* a lot of labor costs in *maintenance alone*.

Anyway, that's why a number of the biggest railways in the country *insist* on ALL-HEART CYPRESS.

"BUY BY THE CYPRESS ARROW."
LOOK FOR THIS MARK ON THE END OF
EVERY BOARD—AND ON EVERY BUNDLE.

Our data is at your service.

SOUTHERN CYPRESS MFR'S ASS'N
1265 Perdido Building, New Orleans, La., or
1265 Heard National Bank Building, Jacksonville, Fla.

Steam Turbines

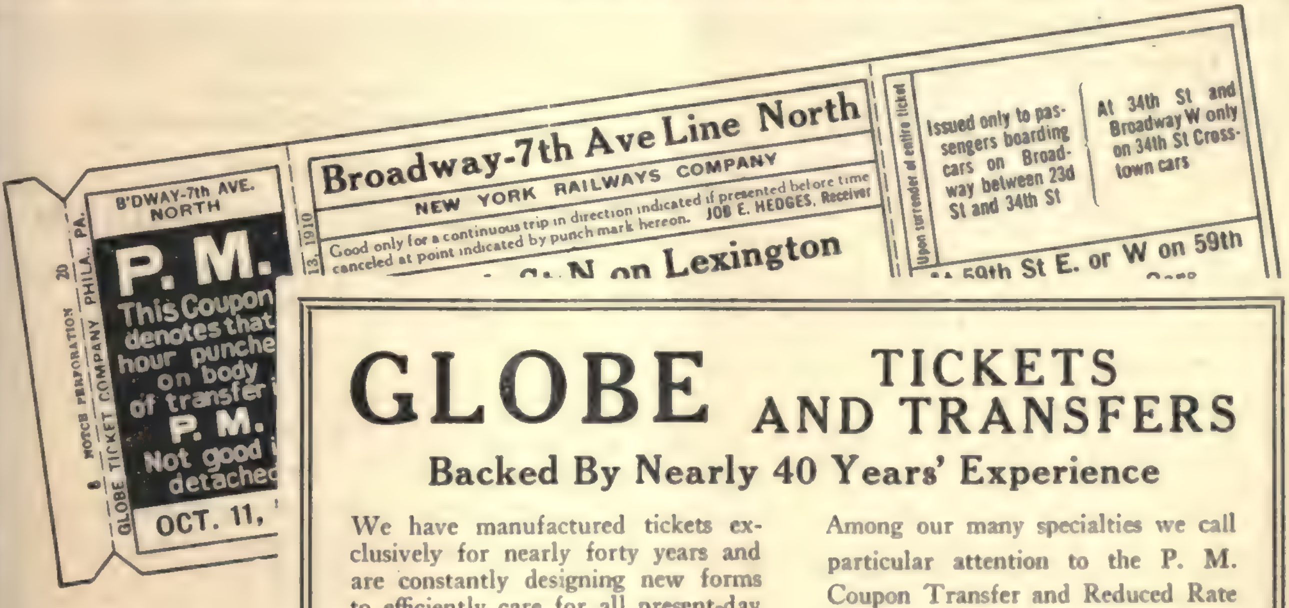
In 1914 Three 5000 K. W., 1800 R. P. M. Allis-Chalmers Turbo Alternators were installed in the station shown at left.

In 1919 One 10,000 K. W. Unit was added to their equipment. (also Allis-Chalmers)

Our company has now under contract and is building another 10,000 K. W. Unit for this same station.

Repeat Orders Indicate Satisfied Purchasers

ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.



B'DWAY-7th AVE. NORTH
P. M.
This Coupon denotes that hour punche on body of transfer
P. M.
Not good detachec
OCT. 11,
20 GLOBE TICKET COMPANY PHILA., PA. 8 NOTCH PERFORATION

Broadway-7th Ave Line North
NEW YORK RAILWAYS COMPANY
Good only for a continuous trip in direction indicated if presented before time canceled at point indicated by punch mark hereon. JOB E. HEDGES, Receiver
13 1910
N on Lexington
Upon surrender of entire ticket
Issued only to passengers boarding cars on Broadway between 23d St and 34th St
At 34th St and Broadway W only on 34th St Crosstown cars
59th St E. or W on 59th

P. M.
COUPON
TRANSFERS

Present-day operating conditions demand quick action by conductors when issuing and receiving transfers. No form gives such instantaneous action nor eliminates abuse so completely as the P. M. Coupon Transfer. They have been used continuously by some large systems for more than fifteen years.

GLOBE TICKETS AND TRANSFERS

Backed By Nearly 40 Years' Experience

We have manufactured tickets exclusively for nearly forty years and are constantly designing new forms to efficiently care for all present-day operating conditions.

Among our many specialties we call particular attention to the P. M. Coupon Transfer and Reduced Rate Tickets of all kinds.

May we send you samples of the forms best suited to your requirements?

GLOBE TICKET COMPANY
112-114 North 12th Street
Philadelphia, Pa.

Quality is remembered when price is long forgotten.
That's why "Tool Steel" gears and pinions are increasingly popular.

American
Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDERED
TRIPLEX

*Send for new
Rail Bond book*

American Steel & Wire Company
CHICAGO
NEW YORK

Aluminum Company of America
General Sales Office
2400 Oliver Bldg., Pittsburgh, Pa.

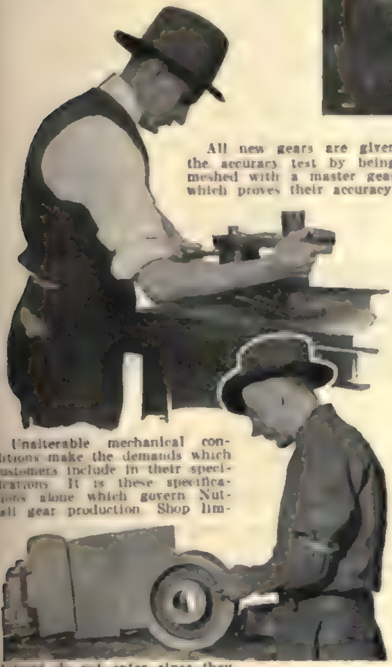
PRODUCERS *of* ALUMINUM
Manufacturers of
ELECTRICAL CONDUCTORS
for
Industrial, Railway and Commercial Power Distribution
also
Ingot, Sheet, Tubing, Rod, Rivets, Moulding, Extruded Shapes, Bronze Powder and Foil
also
Litot Aluminum Solders and Flux

CANADA
Northern Aluminum Co., Ltd., Toronto
ENGLAND
Northern Aluminium Co., Ltd., London
LATIN AMERICA
Aluminum Co. of South America, Pittsburgh, Pa.

Nuttall Helical Gears

A PROVEN SUCCESS

Heat treating under absolute mechanical control is one of the important factors entering into Nuttall gear quality.



All new gears are given the accuracy test by being meshed with a master gear which proves their accuracy.

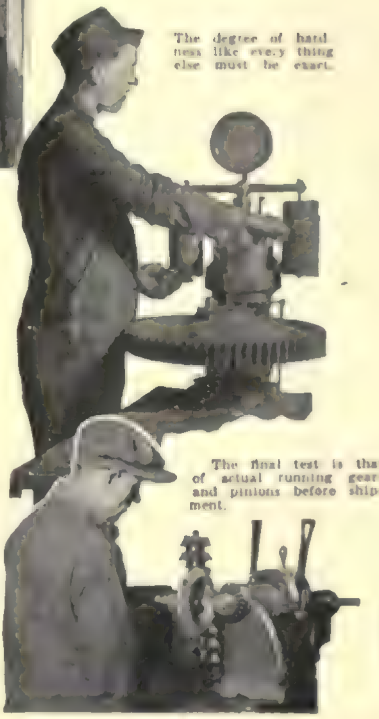
Unalterable mechanical conditions make the demands which customers include in their specifications. It is these specifications alone which govern Nuttall gear production. Shop limitations do not enter since they do not exist.

The Meaning of Pedigreed Gears

Pedigreed live-stock stands as an example of man's pride in developing, maintaining and improving a high standard. Pedigreed stock can be registered as such only when all the important facts about its history prove that it attains to a fixed standard.

Nuttall pedigreed gears are an example of how man's desire for a high mechanical standard has been met. Nuttall gears become pedigreed only when they meet the standards set for them at the end of each step of the process of production. Nuttall gears are successful in service because they meet the rigid tests which make them—Pedigreed Gears.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA



The degree of hardness like everything else must be exact.

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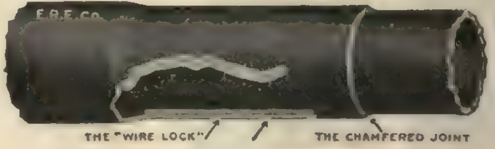

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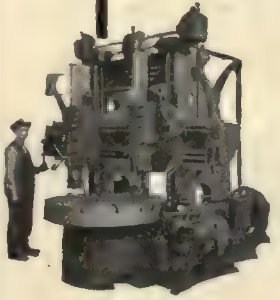

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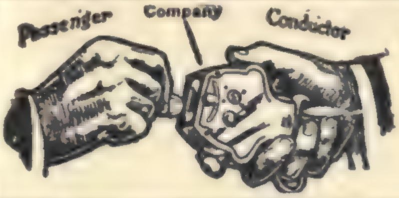

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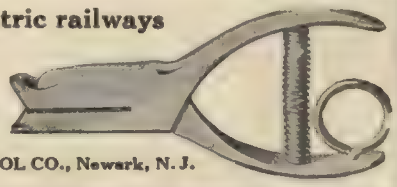

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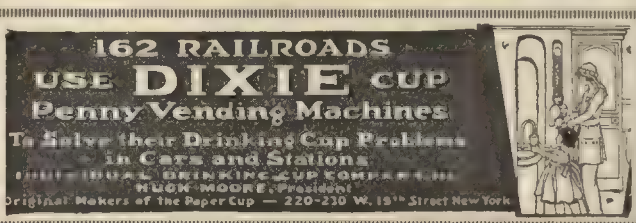

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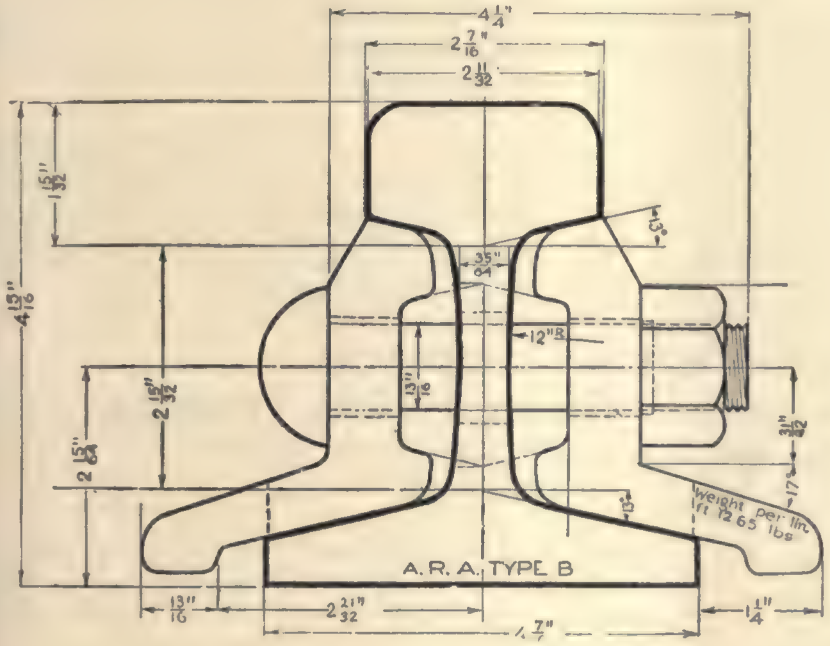

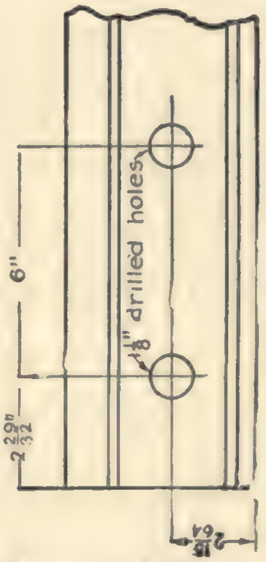

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DISCOUNTS

Sales amounting to $100,000 to $250,000—10%.

Sales amounting to $250,001 to $350,000—15%.

Sales amounting to $350,001 to $450,000—20%.

Sales on entire remaining balance in one sale—25%.

Sales on entire quantity of Lineman's tool belts and wooden barrow reels—10%.

Reels

Quantity 2,000. Type, wood, reinforced and braced with metal braces. Fixed price $4.00 each. Located at Phila., Pa. Order through New York City. S.P.D. No. 3504. These reels were manufactured by M. Kline & Co., Chicago, Ill.

Reels

Quantity 110. Type, wood, Barrow (payout). Fixed price $5.60 each. Located at Ft. Sam Houston, Texas. Order through San Antonio, Texas. S.P.D. No. 968. These reels were manufactured by M. Kline & Co., Chicago, Ill.

In ordering, address the Depot Quartermaster at the addres
number of the commodity desired. Information on other in

BOSTON
Army Supply Base
Boston, Mass.

NEW YORK
461 Eighth Avenue
New York, N. Y.

ATLANTA
Transportation Bl
Atlanta, Ga.

NESS
MALL

Reels

Quantity 1599. Type, wood, Barrow (payout). Fixed price $5.60 each. Located at Chicago, Ill. Order through Chicago, Ill. S.P.D. No. 969. These reels were manufactured by M. Kline & Co., Chicago, Ill.

Wire

Quantity 541,277 ft. Type, No. 14 B. & S. H.D. Tw. pr. Fixed price per M. ft. $13.92. Located at Army Reserve Depot, New Cumberland, Pa. Order through New York City. S.P.D. No. 2229.

Wire

Quantity 26,060,430 ft. Type, O.D.T.P. No. 17 B and copper clad. Fixed price per mile $54.304. Located at Army Reserve Depot, New Cumberland, Pa. Order through New York City. S.P.D. No. 2230.

Wire

Quantity 100,000 ft. Type, house, No. 19 Tw. pr. 36 miles for inside wiring purposes, used principally for telephone work. Rubber covered single braided, olive green with red and green tracers. Fixed price $9.68 per M. ft. Location: Philadelphia, Pa. Order through New York City. S.P.D. No. 13,586.

Wire

Quantity 100,000 ft. Type, house, 36 miles, Tw. pr. soft copper, each conductor A-26 (new). Insulated with rubber compound and cotton braid. Coils packed in boxes. Fixed price $9.68 per M. ft. Location: Fontana Whse., Ft. Mason, Cal. Order through San Francisco, Cal. S. P.D. No. 13,587.

Wire

Quantity 100,000 ft. Type, house, 36 mils, tw. pr. Used for interior house wiring, rubber insulation, cotton covered, slate colored with red dots. Fixed price $9.68 per M. ft. Location: Signal Se., Army Base, Brooklyn, N. Y. Order through New York City. S.P.D. No. 13588.

Wire

Quantity 30,011 ft. Type, outside dist., No. 17. Fixed price $10.24 per M. ft. Location: Camp Franklin, Md. Order through New York City, S.P.D. No. 10150.

Wire

Quantity 185,920 ft. Type, inside, tw. pr., No. 17. Fixed price $10.24 per M. ft. Location: Camp Franklin, Md. Order through New York City. S.P.D. No. 10151.

Cable

Quantity 1,000,560 ft. Type, lead covered telephone, 10 pr., No. 22 ga. Fixed price $60.32 per M. ft. Location: New Cumberland, Pa. Order through New York City. S.P.D. No. 3550.

Cable

Quantity 47,520 ft. Type, lead covered, 10 pr., No. 22 ga. Fixed price $60.32 per M. ft. Location: New Cumberland, Pa. Order through New York City. S.P.D. No. 3550.

Cable

Quantity 79,200 ft. Type, lead covered telephone, 10 pr., No. 22 ga. Fixed price $60.32 per M. ft. Location: New Cumberland, Pa. Order through New York City. S.P.D. No. 3550.

Cable

Quantity 311,520 ft. Type, lead covered, 15 pr., No. 22 ga. Fixed price $73.25 per M. ft. Location: New Cumberland, Pa. Order through New York City. S.P.D. No. 3550.

elow and mention M. & E. M. List No. 12, giving the S. P. D.
items may also be had upon inquiry at these addresses.

CHICAGO
West 39th Street
Chicago, Ill.

SAN FRANCISCO
Fort Mason
San Francisco, Cal.

SAN ANTONIO
San Antonio, Texas

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Acetylene Service and Apparatus
Oxweld Acetylene Co.

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Ammeters
Weston Electrical Instrument Co.

Anchors, Guy
Electric Service Supplies Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Ash Storage Tanks, Cast Iron
Green Engineering Company

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Cambria Steel Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
Johns-Manville Co., H. W.

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Oxweld Acetylene Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes, Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Ackley Brake & Supply Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

Bricks, Fire
Green Engineering Co.

Bridges and Buildings
American Bridge Co.

Brooms, Track, Steel or Rattan
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Bunkers, Coal
American Bridge Co.

Bushings
National Metal Molding Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables (See Wires and Cables)

Carbon Brushes (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Ackley Brake & Supply Corp.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car (See Headlining)

Circuit Breakers
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
Chicago Pneumatic Tool Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.

Conduits, Interior
National Metal Molding Co.

Conduits, Underground
Johns-Manville Co., H. W.

Connectors, Solderless
Frankel Connector Co.
Westinghouse Elec. & Mfg Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Johns-Manville Co., H. W.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
Portable Machinery Co

Conveyors, Coal and Ash
Green Eng. Co.
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

Conveying and Hoisting Machinery
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
Green Eng. Co.
Portable Machinery Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Cranes
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing Signals (See Signals, Crossing)

Crossings, Frog and Switch
Wharton, Jr., & Co., Wm.

Crossings, Track (See Track, Special Work)

Culverts
Armco Iron Culverts and Flume Mfr's. Assn.

Curtains and Curtain Fxtures
Brill Co., The J. G.
Electric Service Supplies Co
St. Louis Car Co.

Cutouts
Chicago Fuse Mfg Co.

Cutting Apparatus Oxy Acetylene
Oxweld Acetylene Co.

Dealers' Machinery
Archer & Baldwin
Electric Equipment Co.
Foster Co., L. B.
Hyman Michaels Co.

Derailing Devices (See also Track Work)
Cleveland Frog & Crossing Co.
Wharton, Jr., & Co., Wm.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc

Draft Rigging (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Chicago Pneumatic Tool Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Drinking Cups, Sanitary Paper
Individual Drinking Cup Co., Inc

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Inc., Walter A.

Electrical Wires and Cables
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co The
Clarke & Co. Engr. Corp., E. W.
Engel & Hevenor
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jacobs & Co., J. L.
Jackson, Walter
Parsons, Klapp, Brinkerhoff & Douglas
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Richey, Albert S.

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PHILADELPHIA

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- Sanderson & Porter
- Scofield Engineering Co.
- Stone & Webster
- White Engineering Corp., The J. G.

Engines, Gas, Oil or Steam
- Allis-Chalmers Mfg. Co.
- Ingersoll-Rand Co.
- Westinghouse Elec. & Mfg. Co.

Fare Boxes
- Brill Co., The J. G.
- Cleveland Fare Box Co.
- Johnson Fare Box Co.
- National Railway Appliance Co.

Feed Water Heating
- Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
- American Steel & Wire Co.

Fenders and Wheel Guards
- Brill Co., The J. G.
- Cleveland Fare Box Co.
- Consolidated Car Fender Co.
- Electric Service Supplies Co.

Fibre and Fibre Tubing
- Continental Fibre Co.
- Johns-Manville Co., H. W.
- Westinghouse Elec. & Mfg. Co.

Field Coils (See Coils)

Filters, Water
- Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus
- Castle Inc., James M.
- Johns-Manville Co., H. W.

Floodlights
- Electric Service Supplies Co.

Flooring Composition
- American Mason Safety Tread Co.

Flooring, Grating
- Irving Iron Works

Forgings
- Columbia M. W. & M. I. Co.
- Eureka Co.
- Standard Steel Works Co.
- Williams & Co., J. H.

Frogs, Track (See Track Work)

Funnel Castings
- Wharton, Jr., & Co., Inc., Wm.

Fuses and Fuse Boxes
- Chicago Fuse Mfg. Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Johns-Manville Co., H. W.
- Westinghouse Elec. & Mfg. Co.
- Williams & Co., J. H.

Fuses, Refillable
- Chicago Fuse Mfg. Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.

Gages, Oil and Water
- Ohio Brass Co.

Gaskets
- Power Specialty Co.
- Westinghouse Traction Brake Co.

Gas-Electric Cars
- General Electric Co.

Gas Producers
- Westinghouse Elec. & Mfg. Co.

Gates, Car
- Brill Co., The J. G.

Gear Blanks
- Standard Steel Works Co.

Gear Cases
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Westinghouse Elec. & Mfg Co.

Gears and Pinions
- Ackley Brake & Supply Corp.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- General Electric Co.
- National Railway Appliance Co.
- Nuttall Co., R. D.
- Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
- General Electric Co.

Generators
- Allis-Chalmers Mfg. Co.
- General Electric
- Westinghouse Elec. & Mfg. Co.

Gongs (See Bells and Gongs)

Graphite
- Morganite Brush Co., Inc.

Grates, Chain
- Green Eng. Co.

Greases (See Lubricants)

Grinders and Grinding Supplies
- Indianapolis Switch & Frog Co.
- Metal & Thermit Corp.
- Railway Track-work Co.

Grinding Blocks and Wheels
- Railway Track-work Co.

Guards, Cattle
- American Bridge Co.

Guards, Trolley
- Electric Service Supplies Co.
- Ohio Brass Co.

Harps, Trolley
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- More-Jones B. & M. Co.
- Nuttall Co., R. D.
- Star Brass Works

Headlights
- Electric Service Supplies Co.
- General Electric Co.
- Ohio Brass Co.
- St. Louis Car Co.

Heaters, Car (Electric)
- Consolidated Car Heating Co.
- Gold Car Heating & Lighting Co.
- National Ry. Appliance Co.
- Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water
- Cooper Heater Co.
- Smith Heater Co., Peter

Heaters, Car (Stove)
- Electric Service Supplies Co.
- Smith Heater Co., Peter

Hoists and Lifts
- Columbia M. W. & M. I. Co.
- Ford-Chain Block Co.
- Niles-Bement-Pond Co.

Hose
- Ingersoll-Rand Co.

Hose, Bridges
- Ohio Brass Co.

Hydraulic Machinery
- Allis-Chalmers Mfg. Co.
- Niles-Bement-Pond Co.

Injectors
- Schutte & Koerting Co.

Inspection
- Electrical Testing Lab's

Institutions, Educational
- Hamilton Institute, Alex.

Instruments, Measuring, Testing and Recording
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.
- Weston Elec. Instrument Co.

Insulating Cloth, Paper and Tape
- General Electric Co.
- Johns-Manville Co., H. W
- Okonite Co.
- Westinghouse Elec. & Mfg. Co.

Insulation (See also Paints)
- Anderson Mfg. Co., A. & J. M.
- Electric Ry. Equipment Co.
- Electric Service Supplies Co.
- General Electric Co.
- Johns-Manville Co., H. W
- Okonite Co.
- Mitchell-Rand Mfg. Co.
- Westinghouse Elec. & Mfg. Co.

Insulators, Section
- Flood City Mfg. Co.

Insulators (See also Line Material)
- Anderson Mfg. Co., A. & J. M.
- Drew Electric & Mfg. Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- General Electric Co.
- Johns-Manville Co., H. W
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Insulator Pins
- Electric Service Supplies Co.
- Hubbard & Co.

Jacks (See also Cranes, Hoists and Lifts)
- Brill Co., The J. G.
- Buckeye Jack Mfg. Co.
- Columbia M. W. & M. I. Co.

Joints, Rail
- Lackawanna Steel Co.
- Zelnicker Supply Company, Inc., Walter A.

Journal Boxes
- Bemis Car Truck Co.
- Brill Co., J. G.

Lamp Guards and Fixtures
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent (See also Headlights)
- Anderson Mfg. Co., A. & J. M.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
- Ohio Brass Co.

Lathe Attachments
- Williams & Co., J. H.

Lathes, Car Wheel
- Niles-Bement-Pond Co.

Lightning Protection
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- General Electric Co.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
- Anderson Mfg. Co., A. & J. M.
- Archbold-Brady Co.
- Columbia M. W. & M. I. Co.
- Drew Electric & Mfg. Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co
- Eureka Co.
- General Electric Co.
- Hubbard & Co.
- Johns-Manville Co., H. W.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Loaders, Wagon, Truck or Car
- Portable Machinery Co.

Locking Spring Boxes
- Wharton, Jr., & Co., Wm.

Locomotives, Electric
- Brill Co., The J. G.
- General Electric Co.
- McGuire-Cummings Mfg. Co.
- Westinghouse Elec. & Mfg. Co.

Lubricating Engineers
- Galena-Signal Oil Co.
- Universal Lubricating Co.

Lubricants, Oil and Grease
- Galena-Signal Oil Co.
- Universal Lubricating Co.

Machine Tools
- Columbia M. W. & M. I. Co.
- Niles-Bement-Pond Co.

Machine Work
- Columbia M. W. & M. I. Co.

Manganese Steel Castings
- Wharton, Jr., & Co., Wm.

Manganese Steel Special Track Work
- Wharton, Jr., & Co., Wm.

Meters (See Instruments)
- Electric Service Supplies Co.

Mirrors for Motormen
- Drew Elec. & Mfg. Co.

Molding, Metal
- National Metal Molding Co.

Motormen's Seats
- Electric Service Supplies Co.
- Wood Co., Chas. N.

Motors, Electric
- Allis-Chalmers Mfg. Co.
- Westinghouse Elec. & Mfg. Co.

Motors and Generators, Sets
- General Electric Co.

Nuts and Bolts
- Allis-Chalmers Mfg. Co.
- Barbour-Stockwell Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Hubbard & Co.
- Lackawanna Steel Co.

Ohmmeters
- Weston Elect'l Instrument Co.

Oil Burning Equipment
- Schutte & Koerting Co.

Oils (See Lubricants)

Oxy-Acetylene (See Cutting Apparatus)

Packing
- Westinghouse Elec. & Mfg. Co.

Paints and Varnishes (Insulating)
- Johns-Manville Co., H. W
- Mitchell-Rand Mfg. Co.

Paints and Varnishes (Insulating)
- Ackley Brake & Supply Corp.

Paints and Varnishes for Woodwork
- National Ry. Appliance Co.

Paving Material
- American Brake Shoe & Fdry. Co.

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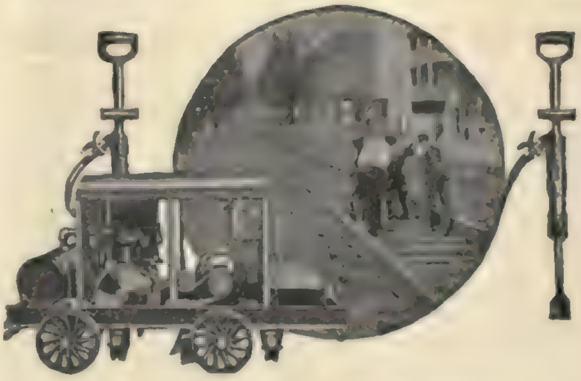

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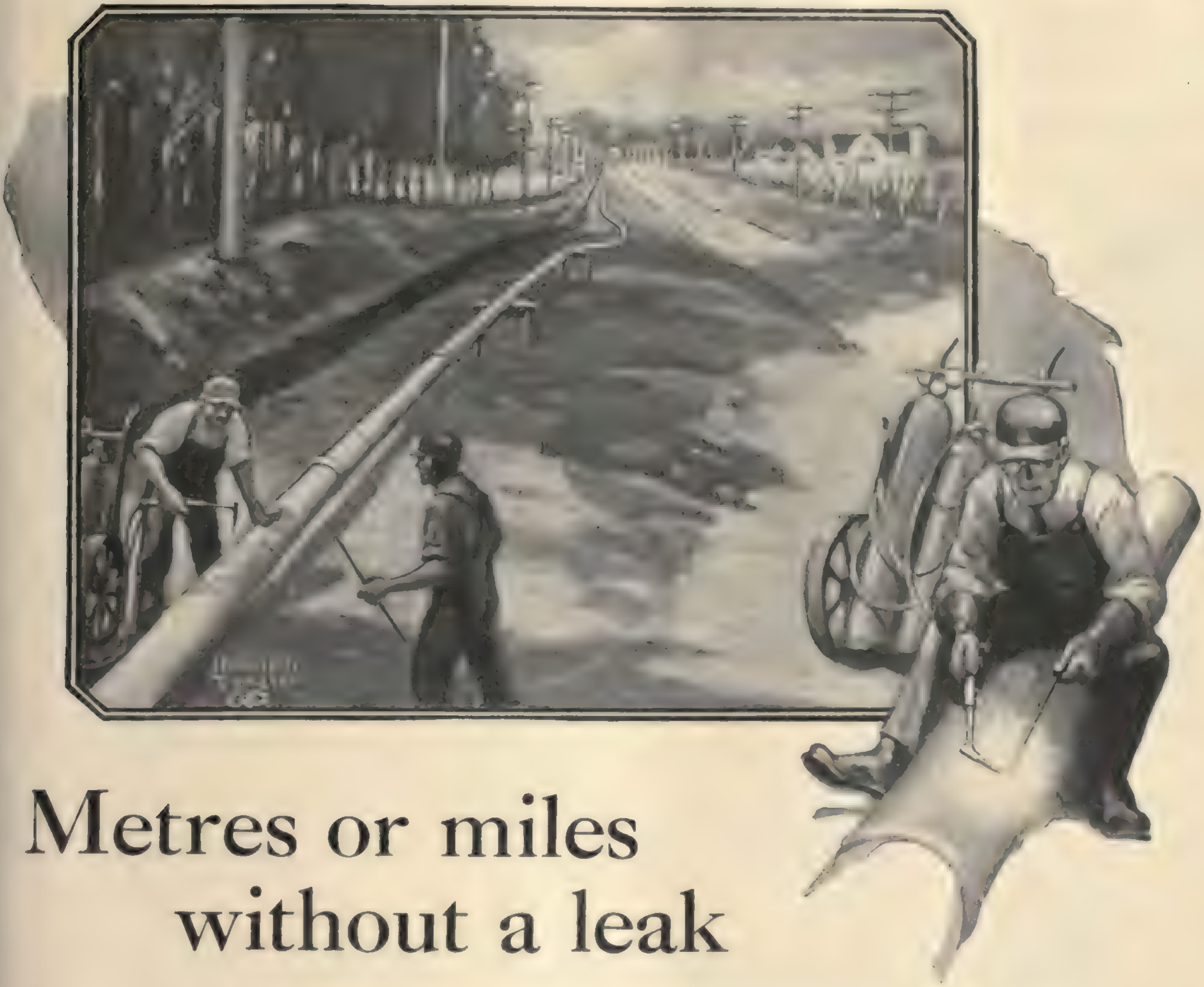

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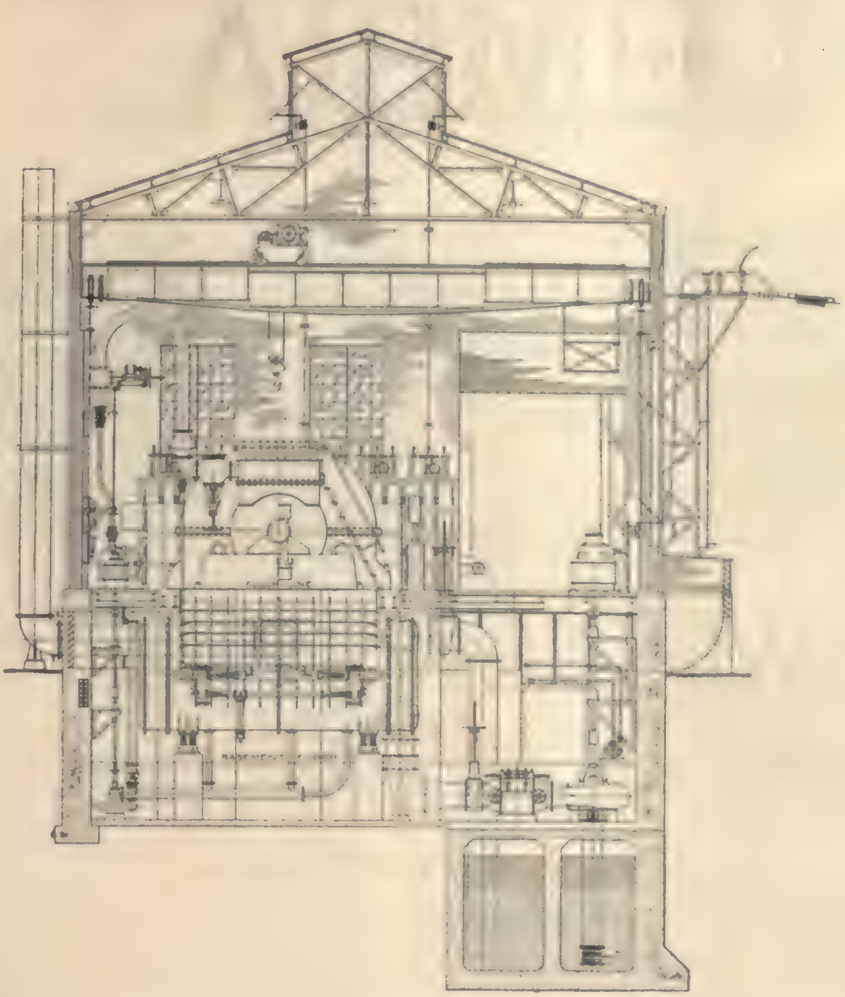

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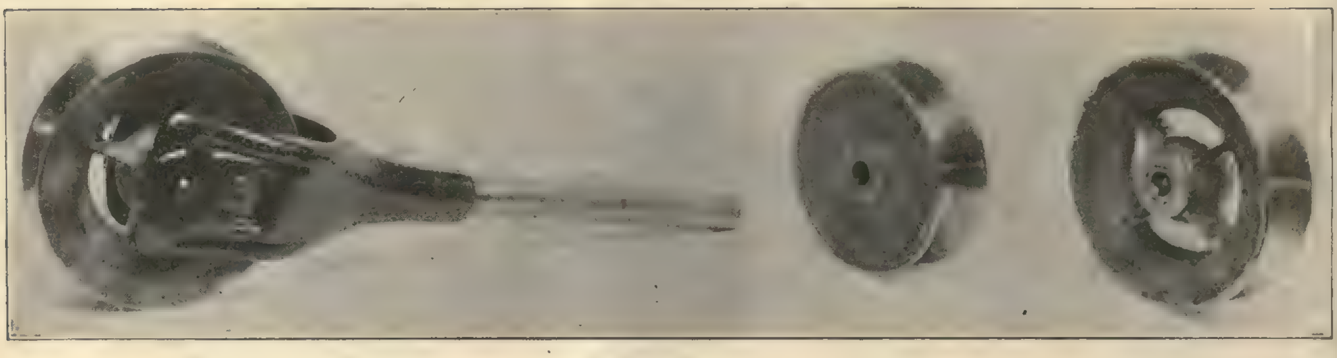


Trolley Wheels and Harps that rank as Aristocrats

They are the thoroughbreds of their kind. Quality is bred in the bone with them, in the shape of metal—good metal, metal especially developed and perfected for this important service. Long wear and good lubrication you may assume as a matter of course—and with these things, the elimination of high maintenance and tie ups. Other progressive roads know and depend on Columbia products. We are prepared to serve you.

The Columbia Machine Works & Malleable Iron Company

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

A. A. GREEN, Sales Mgr., 50 Church St., New York City
Ernest Keller, Frank Hedley, Brooklyn, N. Y.
E. ALLISON THORNWELL, 1026-7 Atlantic Trust Bldg., Atlanta, Ga.

J. L. WHITTAKER, 141 Milk St., Boston, Mass.
F. F. BODLER, 903 Monadnock Bldg., San Francisco, Calif.
W. McK. WHITE, 6712 Cornell Ave., Chicago, Ill.

TOOLS

- Armature and axle straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car Hoists
- Car Replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and axle bearings
- Armature and field coils
- Bearings (axle and armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, rigging, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or malleable iron)
- Grid resisters
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

"We Have Stuck Religiously to the Standard Car"

Mr. E. M. WALKER, *General Manager*

Wabash Avenue in Terre Haute, where Birney Safety Cars have been so successful.

Terre Haute Lines, attributes success to the fact that they have adopted the Standard Birney Safety Car.

BIRNEY
TRADE MARK
SAFETY
CAR

In the discussion which followed the reading of the Report of the Committee on Safety Car operation at the recent A. E. R. A. Convention Mr. E. M. Walker, of Terre Haute, testified to the most satisfactory results which his company has obtained since the adoption of Birney Safety Cars, and in conclusion stated that they attribute their success chiefly to the fact that they have stuck almost religiously to the Standard Car.

The Birney Safety Car was designed to obtain maximum operating results, and experience proves that these are best accomplished with the Standard Car.

Memo

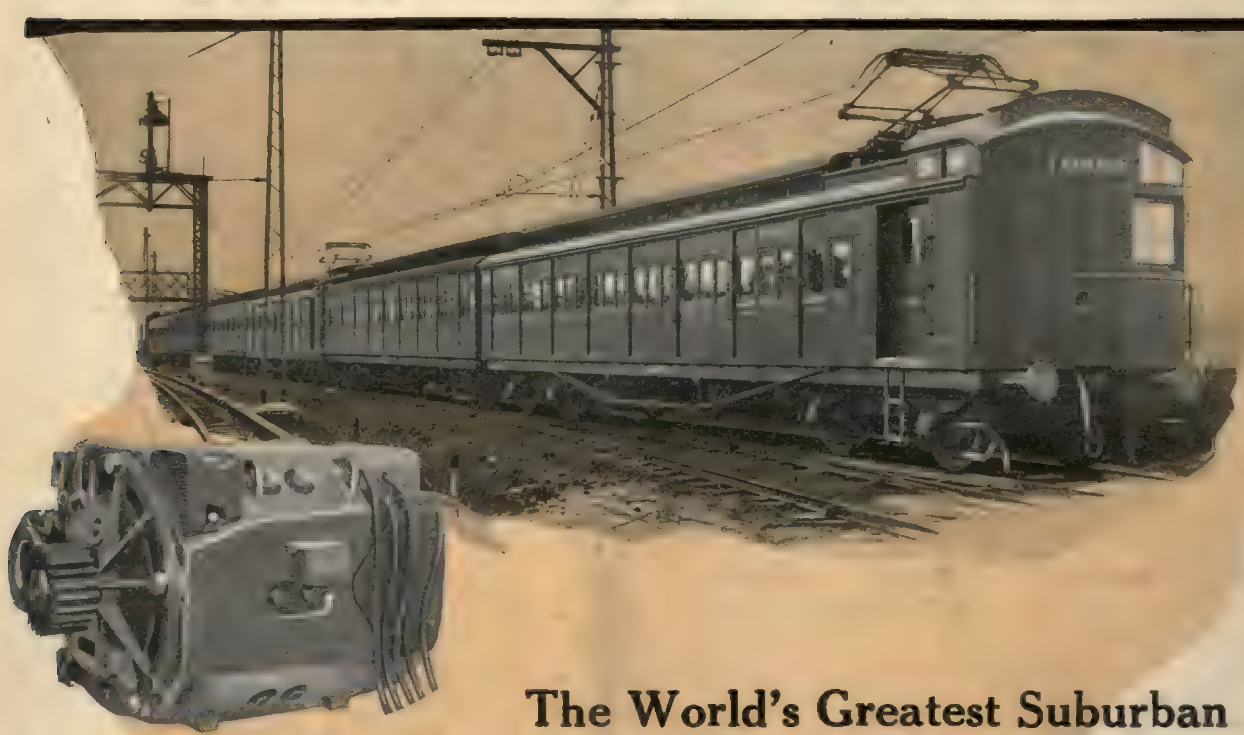
Number of Birney Safety Cars Ordered

2738

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. — ST. LOUIS MO.
G. C. KUHLMAN CAR CO. — CLEVELAND, OHIO.
WASON MANF'G CO. SPRINGFIELD, MASS.

Health, housing and happiness—these three factors in the modern industrial life are dependent upon rapid transportation to counteract the evils of congestion.



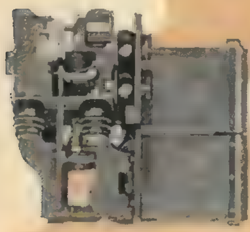
The World's Greatest Suburban Electrification

Pantograph Sliding Trolley.

As long ago as 1896 the General Electric Company suggested the electrification of the many-miled steam rapid-transit systems of "Melbourne the Magnificent." But it was March 1913 before the contracts were placed by the State of Victoria, Australia.

With the experience of the world to draw from, Merz and McClellan, the engineers, recommended the installation of 1500 volts direct current and the use of G-E motor and control equipment for the 400 motor cars and 400 trailers to operate over 335 miles of single track. They found the high-tension direct current was the lowest in both first and continuing costs.

Electrification at Melbourne is making possible a great increase in the steam schedule range of 13 to 18 miles per hour, thus helping to sustain the reputation of this metropolis as a city without congestion.



Line Breaker

Controller

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

25-94

raw-Hill Co., Inc. *Monthly Mechanical and Engineering Edition* November 20, 1920

ELECTRIC RAILWAY JOURNAL

"Phono-Electric"

The long wearing quality of Phono-Electric Contact wire and its ability to withstand the sulphur fumes, heat and grit of the exhaust of the steam engine, has made this wire the standard for high speed suburban and for freight service on electrified steam lines.

Bridgeport Brass Company
Bridgeport — Connecticut

The Cleveland Railways Co.

One of the country's pioneers and leaders in the solving of city transportation problems, will still further perfect its already excellent system by the installation of 200 Westinghouse No. 340 Railway Motors, which have been recently ordered for their 50 new Peter Witt cars.

The adoption of this type of car by many other large cities, and the successful service rendered by over 1550 Westinghouse No. 340 Motors in Cleveland, prove the value of this equipment combination.

Westinghouse Electric and
Manufacturing Company
East Pittsburgh, Pa.

W
WESTINGHOUSE
ELECTRIC

Westinghouse

Vol. 56, No. 21 New York, November 20, 1920 *Pages 1043-1086*

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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Picturing Shop Kinks of the Iowa Electric Railway

Various stereopticon pictures of shop equipment were shown and discussed at the recent Omaha meeting of the Iowa Electric Railway Association with the object of urging master mechanics to describe interesting kinks which they have put into use .... Page 1047

Copper, Zinc, Tin and Their Alloys

In an interesting article by Norman Litchfield the general use of these metals and their alloys by electric railways is covered, together with examples taken from various specifications. High conductivity is an important factor .... Page 1051

Substation Layout of the Southern Pacific in Oregon

Paul Lebenbaum describes in an entertaining way how the power for the 1917 extension of interurban lines is furnished from a substation with outdoor high-tension construction. Two-unit rotary converter sets installed......Page 1055

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Change of Address—when change of address is ordered the new and the old address must be given. Notice must be received at least ten days before the change takes place.

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Circulation of this issue, 7,035

Advertising Index—Alphabetical, 76; Classified, 70, 72, 74; Searchlight Section, 67-69

Two of the new 250 Safety Cars recently purchased by the Eastern Massachusetts (Bay State) Street Ry., all of which carry "Bungalow" air compressors.

"Bungalow" Type Air Compressor

250 "Bungalow" air compressors selected by Largest Electric Railway Line

All the largest orders for Safety Cars include the "Bungalow" air compressor —Brooklyn, 200; Eastern Massachusetts, 250; Public Service Corporation of New Jersey, 200. The highly satisfactory service rendered by this dependable machine resulted in its selection.

Its light weight, low build, compact and rugged form—and above all, its absolute dependability, recommends the "Bungalow" to exacting electric railway service.

Not only the large systems select the "Bungalow," but many smaller ones as well. The "Bungalow" is installed on 3306 Safety Cars operating on 185 different electric railways in the United States.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

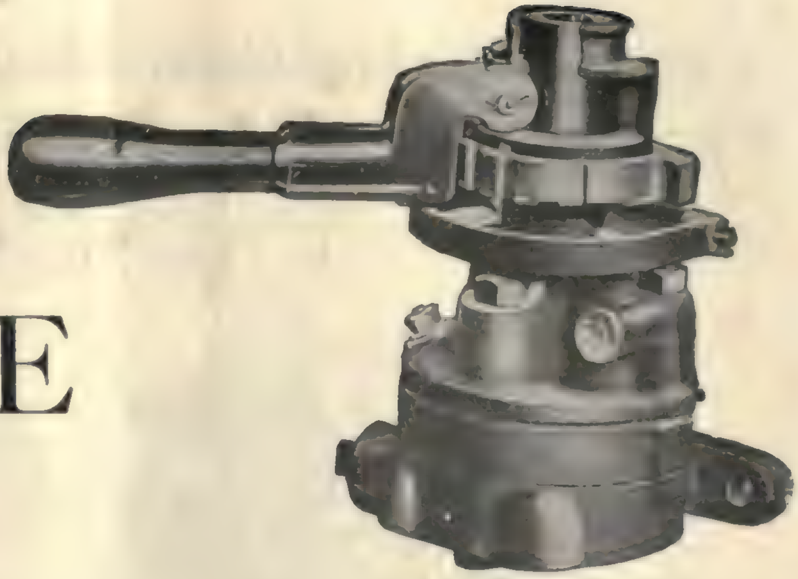
TRADE MARK

New York
San Francisco

Washington

Chicago
St. Louis

PUBLIC SERVICE



Orders Genuine Safety Car Equipment for Better Service to the Public

The recent order of the Public Service Railway of New Jersey for 200 cars with genuine Safety Devices equipment is further proof that the Safety car is a *universal* car because—

In serving the greater part of the State of New Jersey, this company conducts operations ranging from the most congested city streets to sparsely settled country districts.

Hence this order of the Public Service Ry., like that of so many others demonstrates again that there is an important place for light-weight cars in *every* kind of electric railway service, provided such cars are equipped with the time-saving, labor-cutting and safety-assuring features that are embodied to such proved perfection in the Safety Devices combination now operated by the thousands.

Hold Fast to This Specification

IT is a safety car only when equipped with automatic laborless apparatus, so interlocked that, regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brake and sand apply immediately thereafter and the doors unlock for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed before the car can start, and when the air brake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

SAFETY CAR DEVICES COMPANY

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

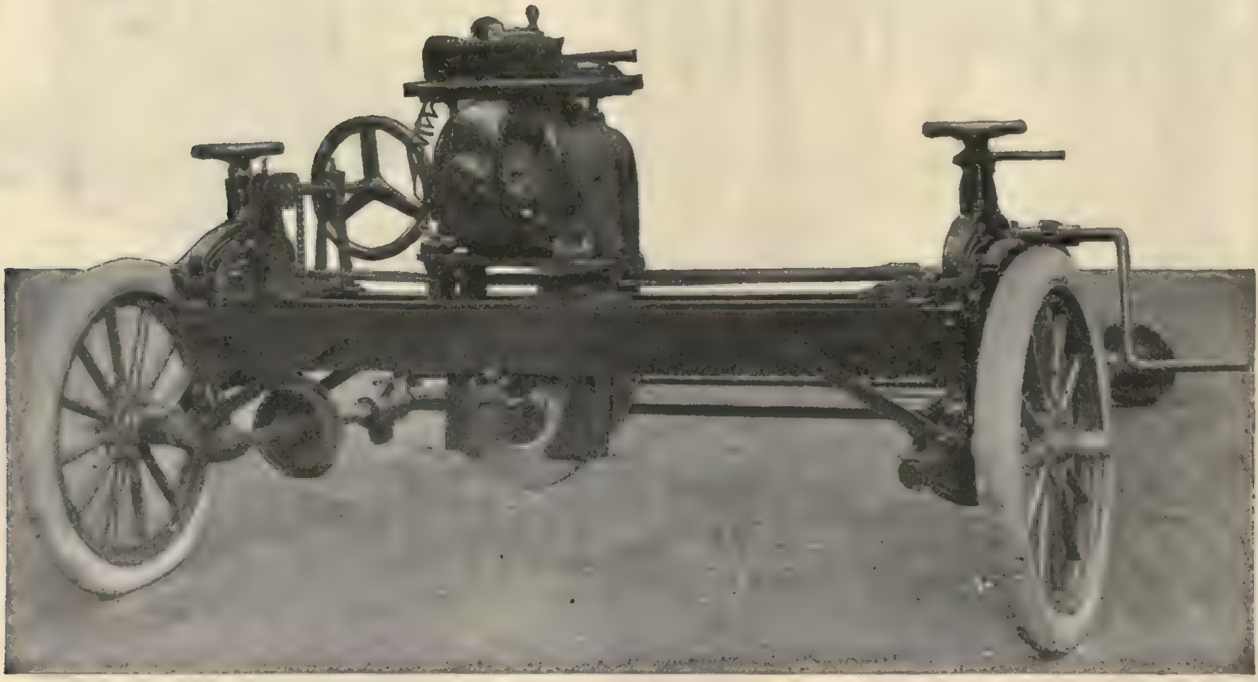
CHICAGO	WASHINGTON, D. C.	NEW YORK	PITTSBURGH	SAN FRANCISCO
Railway Exchange Bldg.	**Munsey, Bldg.**	**City Investment Bldg.**	**Westinghouse Bldg.**	**Southern Pacific Bldg.**

CANADA—**Canadian Westinghouse Co., Ltd., Hamilton, Ont.**

One Great Advantage of

Universal Rotary Track Grinders

Is Their Simplicity



Universal Rotary Track Grinder

—and here are some features:

1. **Large Pneumatic Derail Wheels**
2. **Outboard Bearing on the Grinding Wheel Arbor**
3. **A Grinding Wheel that may be tilted to meet any angle of the rail head**
4. **Adjustable Outrigger**
5. **Easy adjustment of all parts**
6. **Easy operation**
7. **Low working economy**

We also make the "Atlas Rail Grinder" and "Reciprocating Track Grinder"

RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia, Pa.

Exclusive Agents:

ATLAS RAILWAY SUPPLY CO.,
Chicago, Ill.

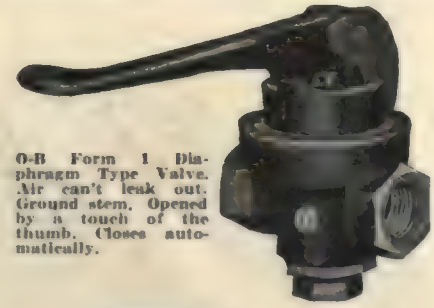
ELECTRICAL ENGINEERING &
MANUFACTURING CO.,
Pittsburgh, Pa.

Exclusive Agents:

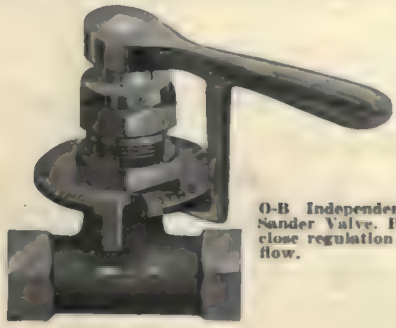
CHAS. N. WOOD CO.,
Boston, Mass.

HITCHCOCK, LLOYD & CO., Inc.
77A Queen Victoria St., E. C.,
London, England.

Be Ready for Winter's Icy Rails With O-B Sander Equipment



O-B Form 1 Diaphragm Type Valve. Air can't leak out. Ground stem. Opened by a touch of the thumb. Closes automatically.



O-B Independent Air Sander Valve. Permits close regulation of air flow.

O-B Sand Trap. Full, free passages.

O-B Reducing Valve. Enforces economical use of air and sand.

Many a winter day your brakes are helpless unless the Sander Equipment is ready for action.

The sturdy O-B Products illustrated are dependable links for a reliable sanding outfit.

Each has its own virtues. All combine for safe economical sanding.

You'll find complete description and listing on pages 599-603. Catalog No. 17.

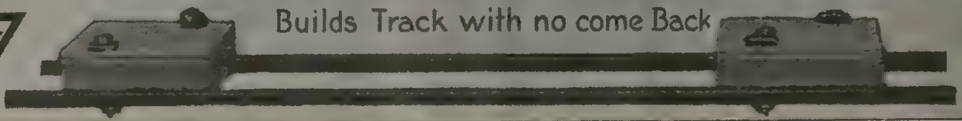
THE OHIO BRASS COMPANY, Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago
San Francisco Los Angeles Paris, France

Manufactures Trolley Materials, Rail Bonds, High Tension Insulators, Third Rail Insulators, Car Equipment Materials.

The RESILIENT RAILWAY TIE

Builds Track with no come Back



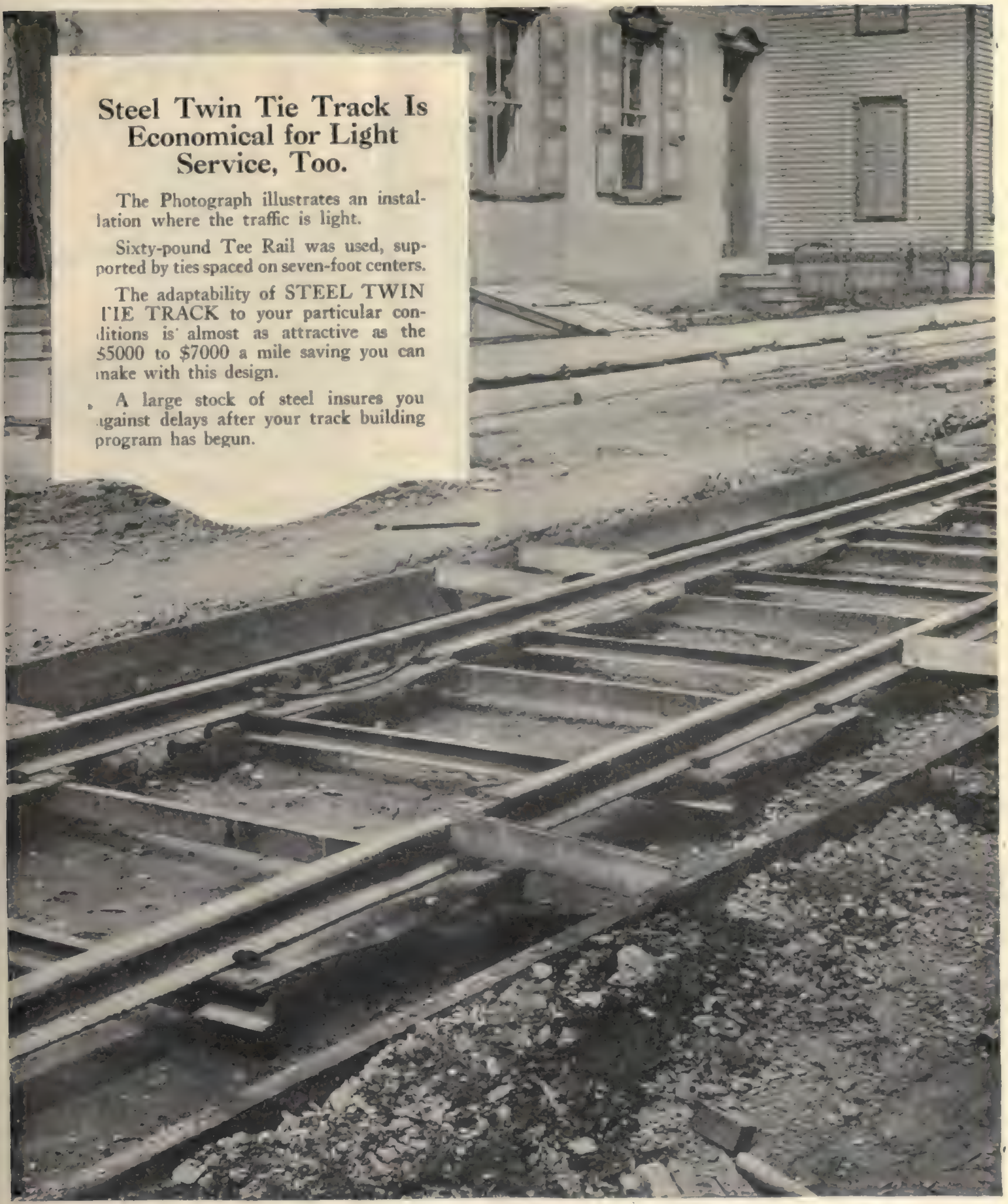
A Stretch of Track Considered Worn Out Reclaimed with

Resilient Joint Boosters

Without interrupting traffic and at little expense you will add several years of service to your track—save the hammer, hammer, hammer on your rails and rolling stock and the temper of your passengers.

Order Joint Boosters now for installation this winter.

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIC



Steel Twin Tie Track Is Economical for Light Service, Too.

The Photograph illustrates an installation where the traffic is light.

Sixty-pound Tee Rail was used, supported by ties spaced on seven-foot centers.

The adaptability of STEEL TWIN TIE TRACK to your particular conditions is almost as attractive as the $5000 to $7000 a mile saving you can make with this design.

A large stock of steel insures you against delays after your track building program has begun.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

Why are Thermit Insert Rail Welds Ultimately the Most Economical Type of Track Construction?

Years of service tests in New York City, Boston, Oklahoma City, Omaha, St. Joseph, Kansas City, Milwaukee, Chicago, Indianapolis, Youngstown, Pittsburgh, Baltimore, have proved conclusively that Thermit Insert Rail-Welds furnish the only method of preventing rail ends from cupping, thus insuring maximum rail life.

Because

1 The Thermit Insert Weld is the only practical fully welded joint on the market.

2 It is fully as strong as the unwelded portion of the rail both in direct tension, bending and other strains and there is no change in section to interrupt the wave motion and elastic curve.

3 Its electrical conductivity is the same as the rail itself and this electrical conductivity will not depreciate with time.

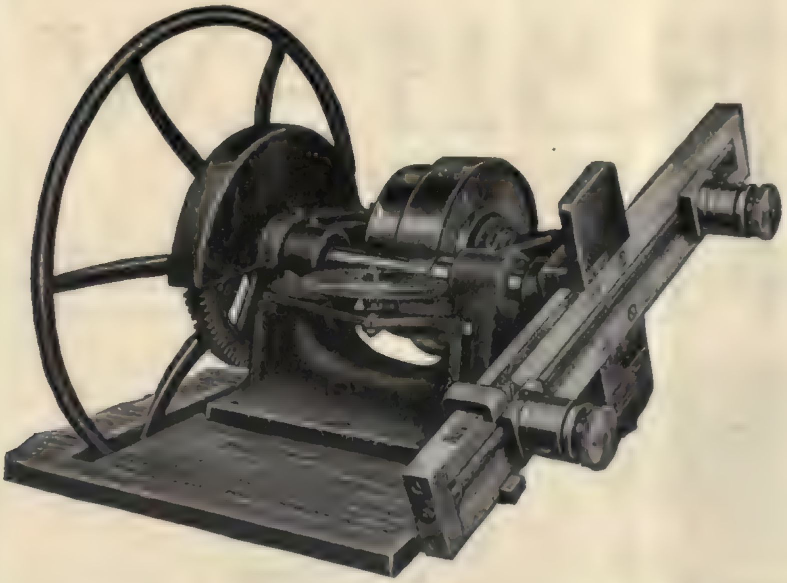
Send for our new Rail Welding Pamphlet 3932.

Metal & Thermit Corporation

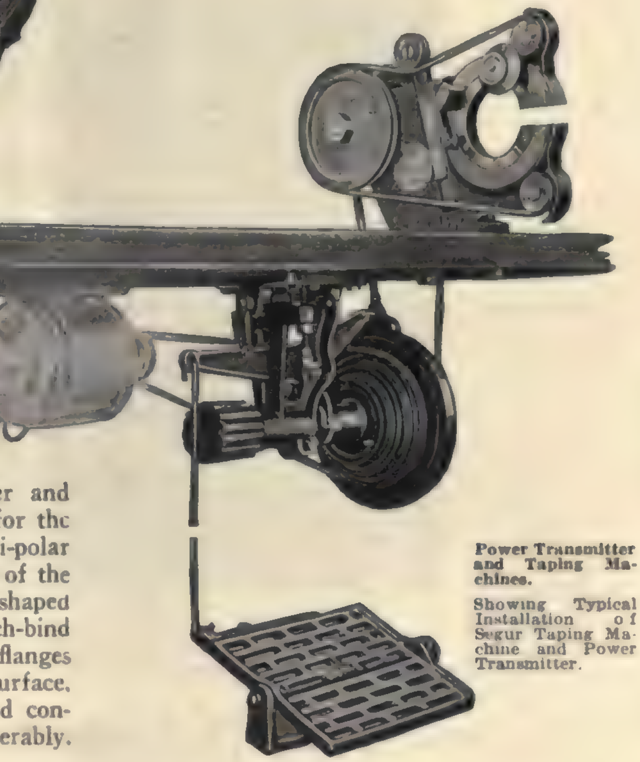
120 Broadway New York

Pittsburgh Chicago Boston San Francisco Toronto

SEGUR COIL WINDING TOOLS



Hair-Pin-Loop Winder and Spreader.



Power Transmitter and Taping Machines.

Showing Typical Installation of Segur Taping Machine and Power Transmitter.

The Segur line of armature coil winding tools, represents a complete line of apparatus designed for the practical manufacture of armature coils in an accurate manner and with a minimum labor cost.

The Segur Hair-Pin Loop armature coil winder and spreader makes it possible to wind armature coils for the smallest or largest armature or stator for multi-polar machines. In using these machines all slot portions of the coils are made radial with the shaft, making perfect shaped wire-wound coils. The outer portion of coils arch-bind when the armature is wound, thus end-supporting flanges are unnecessary, giving the coils more cooling surface, having reduced each coil-turn one to six inches and consequently reducing the armature temperature considerably.

Labor is saved in pairing and grouping coils into bundles because all coils that make a bundle for one slot are wound at one time and an operator, after some experience, will wind from 20 to 30 loops per hour, and as each loop contains from two to five coils it is therefore possible to make from 25 to 128 coils per hour.

The use of these tools does away entirely with the need for other coil forms and the saving in slot room is from .010 to .060 inch, due to the reason that the loop bundle is dipped as one unit instead of as separate coils.

All Segur tools are substantially built for hard and long service, and if properly used should require no expense for maintenance. The material and workmanship is of the best, all parts subject to wear being made of tool steel.

The complete line consists of the following:

Hair-Pin Loop Winder.
Coil Spreader.
Armature Coil Taping Machine.
Coil Winding Lathe Head.
Magnet Wire Reel Rack and Tension Device.
Commutator Screw Press.
Field and Magnet Wire Taping Machine.
Armature Copper Bar Bender.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
7th and Cambria Streets

NEW YORK
50 Church Street

CHICAGO
Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Montreal, Toronto, Winnipeg.

HABIRSHAW

"Proven by the test of time"

Insulated Wire & Cable

Interboro Repair Shops, New York
Showing truck removed from under to Repair Motors, etc.

108 Seconds Headway

THIS is the schedule of the Interboro Subways during the rush hours in New York.

To maintain this without interruption every link in the chain of operations must be made to work as smoothly and continuously as human ingenuity can devise. Repairs must be made before breakage becomes serious enough to cause delays.

During this period a hitch in the service at one end of the line is felt in less than ten minutes at the other end of the line.

The insulated electric conductors used are of the utmost importance.

Habirshaw wires and cables are used in this exacting service because of their proved reliability and long life.

Habirshaw Wire Manufactured by
Habirshaw Electric Cable Co.
Incorporated
Yonkers, New York

Habirshaw Wire Distributed by
Western Electric Company
Incorporated
Offices in All Principal Cities

Paper Insulated Cable
Round Conductor Cables
Sector Cables

Varnished Cambric Insulated Cables
Armored Cables

Rubber Insulated Cables
Code (Black Core)
Intermediate (Red Core)
30% Hevea R. S. A. Standard

EXACTLY SO!

Standardize! Pneumatize!

Re: Effect on Traffic

Discussing the economics of schedules at the 1920 Convention of the American Electric Railway Transportation & Traffic Association, Alexander Jackson, Superintendent of Timetables Public Service Railway of New Jersey, said:

> "The principal effect on traffic is that increasing speed reduces the number of cars in any given area at a given time, to give the same service. This reduces congestion, with a consequent increase in regularity. From the passenger's point of view, higher speed means a quicker trip, and speed is an important factor to be taken into consideration with jitney competition.
>
> "For example, assume a property operating 100,000 car-miles a day at a speed of 8.50 mph consuming 11,765 car-hours. The speed is increased 10% to 9.35 mph. Then to operate 100,000 car-miles, 10,695 car-hours would be used, making a total daily saving of 1070 car-hours.
>
> "Under the old speed 840 (14-hour) cars would be used, while the new speed would require 764 cars, saving 76 cars."

Higher schedule speed comes through the reduction of boarding, standing, alighting and starting periods. You can best attain that higher schedule speed with means that are safe, labor-saving and automatic by the installation of the National Pneumatic "Rushour" line comprising:

NATIONAL PNEUMATIC

Door and Step Control
Door and Step Mechanisms
Motorman's Signal Lights
Safety Interlocking Door Control
Multiple Unit Door Control

For any kind of on-the-surface, over-the-surface and under-the-surface electric railroading whatsoever.

National Pneumatic Company, Inc.

50 Church St., New York
Edison Bldg., Chicago
Works: Rahway, N. J.

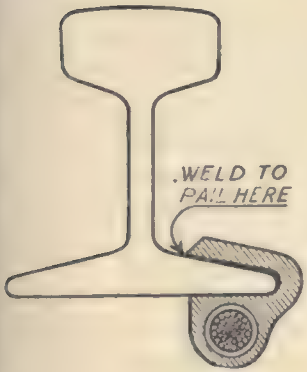
Do you realize Mr. Engineer that every big street railway from New York to Washington is using the Lincoln Carbon Arc Process for welding both new and old rail, and also, that every electric road between California and Maine which is using one or more RWB Dynamotors is each recommending this system for track welding or bonding. Is your company one of the few street railways that has not taken advantage of this method of adding 10 years' life to your old track and cutting maintenance on new track in half? Ask questions now and your 1921 budget will include the purchase of this system. Rail Welding & Bonding Company, Cleveland, Ohio.

London Representative: Electrical Apparatus Export Corporation, 408-9 Bank Chambers, High Holborn.
New York Office: 30 Church Street Chicago Office: 343 So. Dearborn Street

Everlast

Rail Bonds

Are Rightly Named— They Do Last



Way Engineers!

NOTE:

1—Copper cables and connecting sockets are located beneath the base of the rail and are thus protected from injury.

2—Sockets are protected from the arc during the process of welding.

3—Steel terminals fit tightly over the rail flange; and hold themselves firmly in position while being welded.

4—For temporary work the terminals need only be welded along their upper edge. They can then readily be cut loose and used a number of times again.

5—Securing the copper cable to the steel terminals assures maximum durability and conductivity.

Complete details on request.

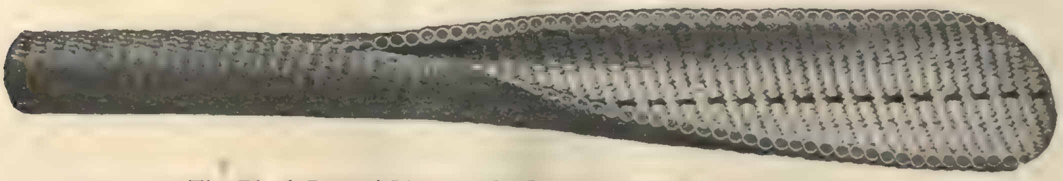
Flood City

Manufacturing Co., Johnstown, Pa.

Use DURADUCT

The Quality Conduit

—To Protect Your Train Circuits



The Black Dotted Line on the Interior Identifies DURADUCT

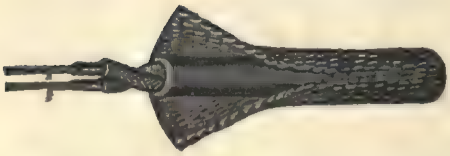
Your use of Duraduct need not be limited to its employment as an inert conduit to protect controller cables and the several individual circuits of your cars.

Its strong single interwoven wall gives Duraduct ample strength to serve for such *active* conditions as are involved in train operation where the wires running from car body to drawbar are subjected to repeated bending on account of the drawbar swinging sideways as the cars turn the curves.

Boston, noted for the sharpest street railway curves in the United States, found Duraduct to be most satisfactory for this service and for its tendency to prevent dangerous chafing of the insulation of the conductors.

Your experience will prove the same if you make sure that you are getting Duraduct, the original and only non-metallic conduit with a single interwoven wall and roller-bearing wireway, identifiable always by the black dotted line on the interior surface.

And to Make Train Circuit Connections Perfect. There's



DURACORD

The Quality Cord

In which wire, "better-than-Underwriters'" rubber and the famous woven cover are united to form a cord of unmatchable strength and flexibility, in every size from signal to power circuits. With Duracord for your train cables and Duraduct for your train conduit, you will have the last word in reliability.

Send for samples of both Duracord and ordinary cord to satisfy yourself why it is so much better.

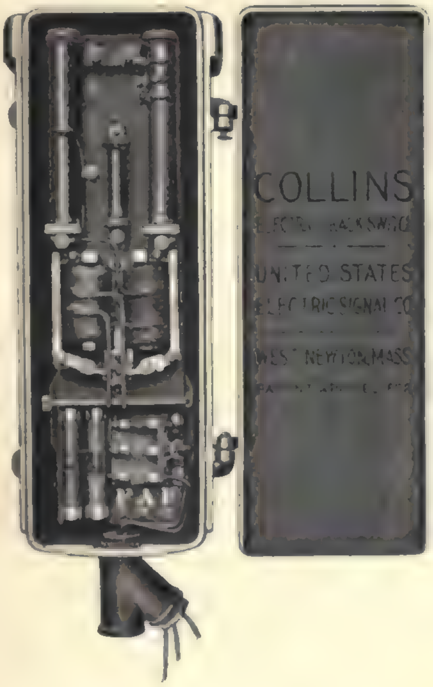
Tubular Woven Fabric Co.

Pawtucket, R. I.

Thanks for the ad, Doctor! We make 'em both!

THIS is what John A. Beeler, the noted traffic engineer, has to say in the ELECTRIC RAILYWAY JOURNAL for Oct. 2, 1920, in discussing ways of improving "Surface Transportation in Congested Districts":

"ELECTRIC SWITCHES AND AUTOMATIC SIGNALS can be used to advantage to save time. Recently I observed a place where it required a minute for the motorman to walk over, throw a hand signal and return to the car. Today a minute is worth 5 cents, as the average car-house expense is at the rate of $3 in these days of high wages. The saving of a total of 5 minutes on a line with a 5-minute headway will permit the saving of $15,000 per year and make available one car for additional service." (***Pardon us for the capitals!***)



Collins Automatic Track Switches have been helping to make traffic movement faster, not merely in individual installations but for complete tower-control systems as at Washington.

U. S. Automatic Trolley Contact Signals, invented originally for highway trolley service, are now used in scores of cities to permit safe short-headway operation with the increasingly-popular safety car.

Devices that save your time, and therefore your money, are worth your while. May we show you where ours will do these important things for you?

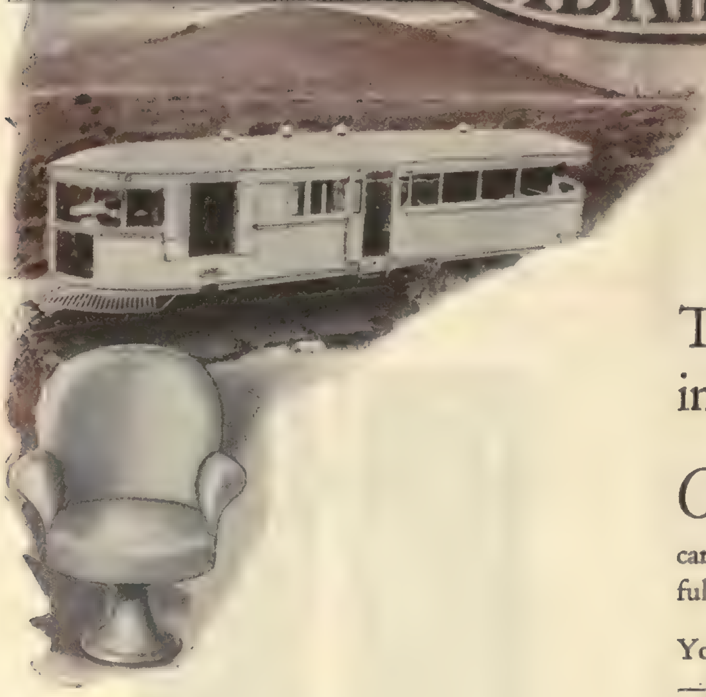
United States Electric Signal Company
West Newton, Massachusetts

Representatives:

Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Services Supply Co., Salford, England

The Fabrikoid Process adds beauty and long life to fabrics; some heavy and rugged, others dainty as linen—all pliable, scuff-proof, stain-proof and water-proof

DU PONT FABRIKOID



The way they do it in California

CAN anything be more striking than this electric operated by the Southern Pacific Company? The car is white, inside and out; the seats are of beautiful *white Fabrikoid.*

You can use Fabrikoid in white or any other color—for this upholstery can be washed with soap and water; instantly cleaned of all grease, dirt and germs. If you value public confidence, you can profitably upholster in Fabrikoid, for the public knows its sanitary qualities.

Fabrikoid will never fade nor grow stiff and uncomfortable; it always retains its beautiful lustre; it is practically scar-proof.

Write for samples and details

DU PONT FABRIKOID COMPANY
WILMINGTON, DELAWARE

Branch Offices:

21 East 40th Street	New York City
Dime Bank Building	Detroit, Mich.
Gugle Building	Columbus, Ohio
McCormick Building	Chicago, Ill.
Merchants Bank Building	Indianapolis, Ind.
Harvey Building	Boston, Mass.
Chronicle Building	San Francisco, Cal

Plant: Newburgh, N. Y.

FABRIKOID

London & Port Stanley
orders
ECONOMY METERS

Coaches are 72-ft. overall, with 500 horsepower equipment and have smoking, express and baggage compartments.

This progressive 1500-volt railroad has ordered ECONOMY METERS for all its equipment—It Will Meter the Energy—That's What It Wants to Save.

As a Power-Saving Device—

The ECONOMY Meter gives the most accurate and most informative unit for inducing the motormen to save power.

On more than 50 roads.

As an Inspection Device—

The ECONOMY Meter provides a continuous means for determining the inspection intervals, without clerical labor.

As an Engineering Device—

The ECONOMY Meter supplies very valuable data on the energy consumption of different types of freight and passenger equipment when operated under varying conditions.

ECONOMY Power-Saving Meters by recording the kilowatt hours consumed, show both the motorman and the management the individual "power bills." Thus they get down to the very fundamentals of energy checking and saving.

Economy Electric Devices Company

L. E. GOULD, Pres.

Old Colony Bldg., Chicago

Cable Address: Sangamo, Chicago.

National Railway Appliance Co., New York
L. A. Nott, San Francisco

Burton R. Stare Co., Seattle
J. G. Monahan, Los Angeles

Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Louis

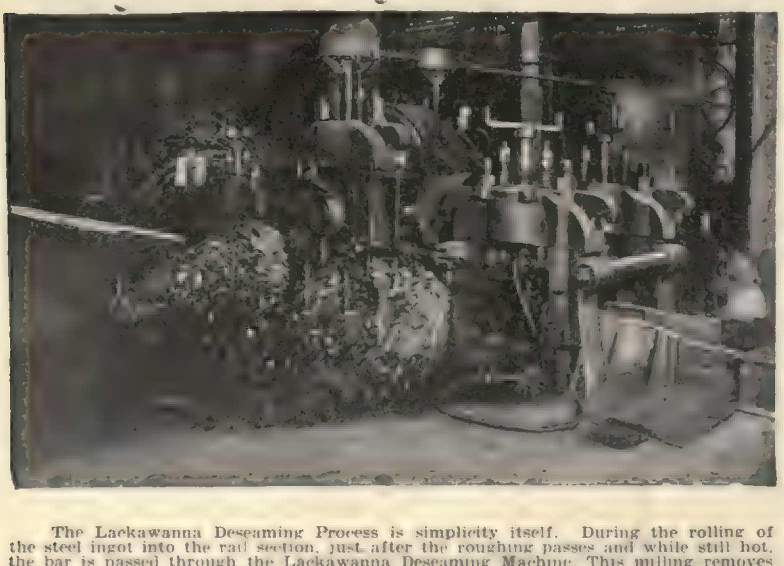
Eliminate One Source of Worry and Get Vastly Superior Track Service

By Using

Lackawanna

Deseamed Rails

A chief engineer of a trunk-line road recently remarked that during one cold winter hardly a day passed when he was not called into conference by the general manager to discuss the rail situation. They were constantly in fear of accidents, and the ghost of broken rails in the track followed him to bed at night. The force detailed for track inspection at night was doubled. The fact that more than 200 rails broke on a stretch of less than 600 miles of his road, in one period of 24 hours, should convince anyone that his fears were neither a joke nor far fetched. Time that was needed for the many and regular duties of these officials was lost in the unusual attention that had to be given to the all-important question of taking precaution against accidents from rail breakage.



The Lackawanna Deseaming Process is simplicity itself. During the rolling of the steel ingot into the rail section, just after the roughing passes and while still hot, the bar is passed through the Lackawanna Deseaming Machine. This milling removes the relatively soft, partially decarburized outer surfaces at the important locations of the rail head and base. The final rolling is thus made upon the harder interior part of the bar where the carbon content is higher. The resulting rail is free from seams and the surface is so much harder that a rail treated by this process will wear many times longer than the same rail untreated and will have no flaws to open up in the base under flexure.

Lackawanna Deseamed Rails have demonstrated an unusual freedom from breakage and in this respect have proven a source of gratification to every responsible head from the president down to the section foreman on every road on which they are used.

Freedom from delays to high speed and heavy tonnage trains demands the utmost elimination of rail breakage, and this necessity for regular operation alone would justify insistence on Lackawanna Deseamed Rails, particularly since *they cost no more* than less dependable rails made in the ordinary way.

The Lackawanna process of making rails wear better, by eliminating one of the commonest contributory causes of rail breakage, has a direct bearing on many economies and an indirect but far-reaching influence on other costs.

ALL LACKAWANNA RAILS ARE DESEAMED

We could cite dozens of instances where the benefits under the one condition might seem far-fetched, but collectively the advantages are very real and well worth providing.

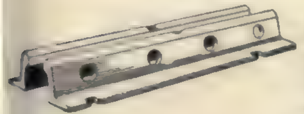
Here's one little point that you may never have thought of: Where a road is protected by automatic block signals a broken rail usually sets the signal requiring trains to stop and proceed cautiously through the block, and this may be repeated several times before the report of the discovery gets the track force out to the job. The necessity of flagging or holding trains while the broken rail is being replaced always causes troublesome and costly delays on busy roads. It is not necessary to dwell on examples: a broken rail or two on a division, even where no accident resulted, has often delayed a fast passenger train an hour or more in getting over the division. All such delays are serious factors in moving traffic.

Rails of Lackawanna quality reduce expense for care and discrimination in the inspection of rails purchased, for special reports on rail failures, investigations, clerical work on data, and special studies by the engineering force. Usually such efforts accomplish no very satisfactory results, but the expense is appreciable.

There is enough to this subject of greater rail safety and longer rail life that you would be well repaid by reading our literature on "The Lackawanna Deseaming Process." Write for copies and tell us about your rail problems.

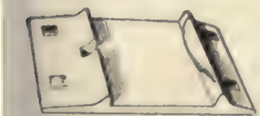
Other Lackawanna Aids to Better Track

The Lackawanna Safety-Head Angle Bar



overcomes liability to wear and fracture by preventing cutting of the bar at the top from back action or upward thrust of the rail ends. This is accomplished by a slight depression in the head of the angle bar for a short space at the center where the rail ends meet.

The Lackawanna Hook-Shoulder Tie Plate

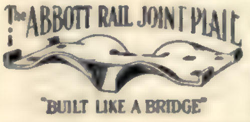


is simple, strong, durable, convenient for installation, and by holding the rail with great security prevents undue wear and destruction of material; saves repair costs and reduces maintenance labor.
Two ribs on top form a channel in which the rail base rests. One of the ribs is plain and the other hooked to make a holder. One or two plain spikes on the plain rib complete the bond between plate and both rail flanges. The plate is fastened to the tie by independent plain or screw spikes. The rail may be removed without disturbing the plate.

Lackawanna Track Bolts & Spikes

Our track bolts and spikes, of all standard sizes for light or heavy rails, enjoy an enviable reputation for careful, accurate workmanship and finish.

The Abbott Rail-Joint Plate



strengthens and otherwise improves ordinary angle bar joints of standard and light toe and girder rails. Its use assures smooth running track surface without the necessity of constantly raising and tamping the joint ties, avoids annoyance and expense from worn and broken bolts and angle bars and protects the rail ends from battering and breaking down.

The hard steel and combination of reversed flanging within the plate provides for internal stresses and imposes the load on the two joint ties with about the same action as between a short deck bridge and its piers. Upturned corner lugs engaging the ends of the angle bars act as anti-creepers and as rail guards to prevent misalignment if the angle bars break or become loose.

Abbott Plates are equally applicable to and advantageous on new or relaid track and will extend the life even of old track for several years. These plates are made in types especially suitable for ordinary steam railway service, for use in paved streets, and for welding to the rail base, and may be held with either screw or ordinary spikes.

Write for our Booklet

"Improved Track Appliances"

Lackawanna Steel Company

General Sales Office and Works: Lackawanna, N. Y.

Boston Buffalo Chicago Cincinnati Cleveland Detroit New York Philadelphia St. Louis San Francisco

Sole Exporter of Our Commercial Products: Consolidated Steel Corporation, 165 Broadway, New York.

With the ever mounting price of coal, high superheat is becoming more and more important as a means of increasing power plant efficiencies. The economical use of high superheat, however, depends upon the ability of power plant machinery to stand up.

THE usual commercial steam turbine in general use for driving power plant auxiliaries becomes impracticable in the typically high superheat stations of today.

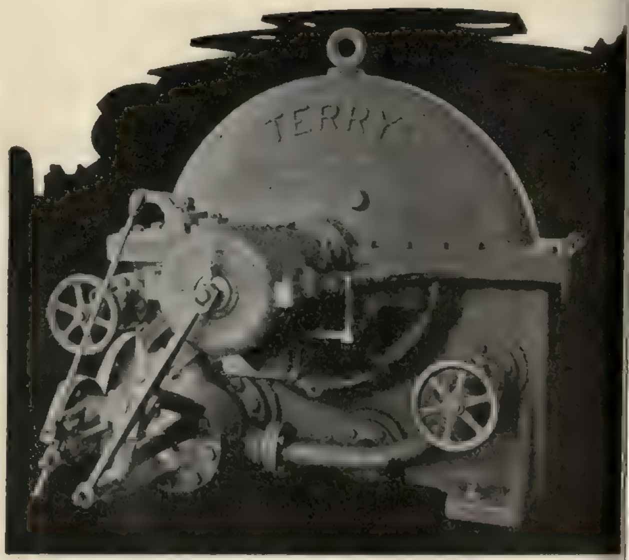
The photographs below show three frames of a complete line of Terry superheat turbines which are built to withstand the highest commercial steam pressures and steam temperatures. High temperature steam comes in contact only with steel and monel metal, thereby eliminating entirely the excessive upkeep cost and shutdowns for repairs found where cast iron, bronze or other materials are used. There are more than fifty of these turbines in successful operation with steam temperatures of about 600 degrees or over.

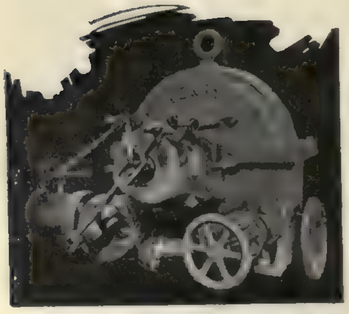
For your high superheat station, select the turbine which is qualified in its material and construction to meet your high temperature requirements.

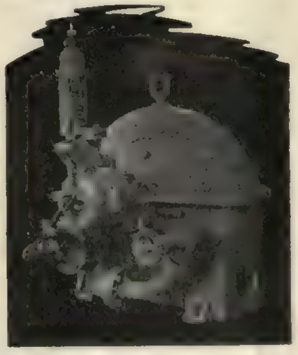
The Terry Steam Turbine Co.
Hartford, Conn., U. S. A.

Built to withstand High Superheat

T-710







THE TERRY TURBINE

An Incident Usually Resulting in Dissatisfied Patrons and Decreased Earnings

"Confound This Service!"

RUNNING ahead of schedule with its resultant loss of public good will and revenue and its accompanying dangers can be promptly detected and corrected by the installation of Nachod Headway Recorders.

With this simple equipment, service complaints can be immediately and intelligently checked, a strict adherence to schedule maintained and a saving of property, power and patronage effected.

But Nachod Headway Recorders can do more. Like automatic inspectors, they faithfully and infallibly record the exact time that every car passes a given point and furnish you each day in graphic form a complete history of all car movements at points of installation during the twenty-four hours preceding. Thus they prevent unauthorized layovers, unnecessary high speed and bunching of cars, minimize the possibility of accidents and maintain equalized loading and higher efficiency of operation.

Nachod Headway Recorders are moderate in cost and simple in mechanism and require no adjustments or technical knowledge. The only necessary attention is a daily winding and a change of record. Write for particulars. Nachod Signal Co., Incorporated, Louisville, Ky. Manufacturers of Automatic Signals for Electric Railways, Highway Crossing Bells and Automatic Headway Recorders.

Nachod Headway Recorders

Reducing the number of Boarding and Alighting Accidents

In a report of accidents covering 12 months a large eastern operating Co. showed that of all the money payed out in accidents, 12% *was for boarding and alighting accidents.*

It is of course impossible to entirely eliminate this type of accident but their number can be materially reduced by giving your conductors an opportunity to devote more time to the *comfort* and *safety* of passengers.

If all a conductor's time is spent in juggling nickels, dimes and pennies and issuing transfers, he can't be blamed for being more or less indifferent to passengers' safety. After all, he can do but one thing at a time.

By installing Johnson Fare Boxes on your cars the fare collection problem is reduced to its simplest form. In addition to increasing gross revenue 3 to 10% they give your conductors more time to practice "Safety First" thereby protecting passengers boarding and alighting. This means fewer accidents and less money paid out in damage suits.

Complete data on request.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.

Sherman Service Is a NATION-WIDE Service

In ten years, Sherman Service has developed a country-wide organization. Our thirteen offices with a personnel of over a thousand specialist-members serve many hundreds of clients, including concerns employing over **100,000** workers each. Every field of manufacture and transportation is represented; our service has proved its value by producing *results* of co-operation, harmony and production. The following industries form but a part of our satisfied clientele:

ELECTRIC STREET RAILWAYS

Asbestos
Automobiles
Bleaching
Boxes
Building Construction
Candy
Celluloid
Cement
Cigars
Clothing
Communities
Corsets
Cotton
Dairy
Department Stores
Dye Works
Electrical Equipment
Engines
Foundry
Furnaces
Furniture
Gloves
Glue
Governments
Hats
Hosiery
Implements
Lace-making
Leather
Lumber
Mining
Oil
Paper
Pianos
Pipes
Publishing
Railroads
Razors
Rubber Goods
Rope
Shipbuilding
Shoes
Silk
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Telephone
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Underwear
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Wool

What we have accomplished for others, we can do for *your workers.* Call one of our representatives for a conference on *your* human element problem.

SHERMAN SERVICE INC.

Production Engineering Industrial Co-ordination

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Largest organization of its kind in the world.

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TEXACO

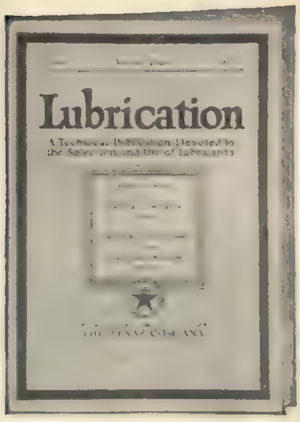
What we Say =

THE TEXAS COMPANY has made a thorough study of the requirements of the electric street railways in the way of lubrication and lubricants and has developed a practical organization fully capable of taking care of all classes of electric street railway work.

Its success in the electric railway field has been due to the fact that high grade lubricants of the correct qualities have been developed, a thoroughly efficient corps of practical street railway engineers has been secured and trained in the practice of lubrication, and suitable stocks of electric railway lubricants have been placed at convenient points from which prompt deliveries are made.

In other words, every demand made by the electric street railway companies has been taken care of promptly and efficiently.

How does your road purchase lubricants?


Lubrication
A Technical Publication Devoted to the Selection and Use of Lubricants
The Texas Company

Do you still operate under a guaranteed mileage basis? Or do you buy the lubricants you need to properly take care of your individual mechanical requirements?

In either case you will be interested in a clear discussion of the relative advantages of both systems.

A discussion of this important question forms the basis of a paper which we shall gladly send to those professionally interested.

This paper also gives the facts and figures which demonstrate the relation of correct lubrication to the possible reduction of operating expenses.

It is accurate and authoritative and every operating man can learn something from it.

We have placed a coupon on the other page for your convenience.

SERVICE

What we do:—

WEST VIRGINIA UTILITIES COMPANY
WHEELING PUBLIC SERVICE COMPANY
CITY AND SUBURBAN GAS COMPANY
CITY RAILWAY COMPANY

Wheeling, W. Va., Aug. 12, 1920

THE TEXAS COMPANY,
Wheeling, W. Va.

Gentlemen:

We take pleasure in answering your inquiry about the service rendered by your Company in connection with our oil supply, by saying that we feel that it has done everything in its power to assist us in our lubrication problems, and has, in practically every case, shown us methods of reducing trouble, as well as economizing in oils.

We have obtained good results from your products, and we wish to say without hesitation that your Company has been more attentive, and more thorough in its engineering advice and service than any other concern we have ever done business with.

We believe that lubrication problems resolve themselves more into a question of service and advice, as to the proper selection of oil for the particular job, than they do to a question of price, and we believe that this service of yours is most valuable.

Very truly yours,
(Signed) J. D. Whittmore, *Gen. Mgr.*

CLIP THIS COUPON

THE TEXAS COMPANY
Dept. RJ, 17 Battery Place, New York City
NEW YORK HOUSTON CHICAGO
Offices in Principal Cities

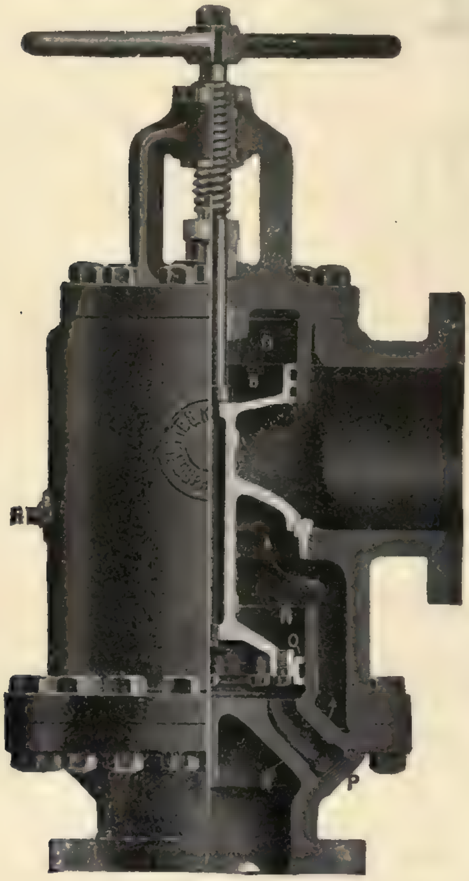
Kindly send me a copy of your paper on Electric Railway Lubrication.

Name .... *Street* ....

City .... *State* ....

11-20

For the Safety of Your Railway Power Plant



Protection against a disastrous explosion and a probable shutdown is not complete by the pop safety valves on your boilers.

Statistics prove that more accidents are due to the backflow of high pressure steam into a boiler in which a tube has burst and from steam pipe explosions caused by the sudden release of high pressure steam through a break in the line.

To be fully protected against both of these dangers—your boiler steam connections should all be equipped with

SCHUTTE

Automatic Emergency Stop and Check Valves

Triple Duty Type

You need these tried and proven valves with all possible speed.

They will instantly cut out a damaged boiler or shut off the steam flow entirely in case a break occurs in any steam pipe line.

Protection is afforded men who may be at work inside of a boiler off the line because the valves cannot be opened by hand, but only will open by boiler pressure acting under the disc. This feature makes them of special value in safely cutting a fresh boiler into service.

May be closed by hand or by steam or electricity from distant points.

Made in Angle Globe or Inverted Patterns.

Write us for Catalog No. 8-B

VALVES
INJECTORS
CONDENSERS
SPRAY NOZZLES
CHEMICAL EQUIPMENT

SCHUTTE & KOERTING

1155 Thompson St. Philadelphia Pa.

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OIL BURNING EQUIPMENT
EVAPORATORS
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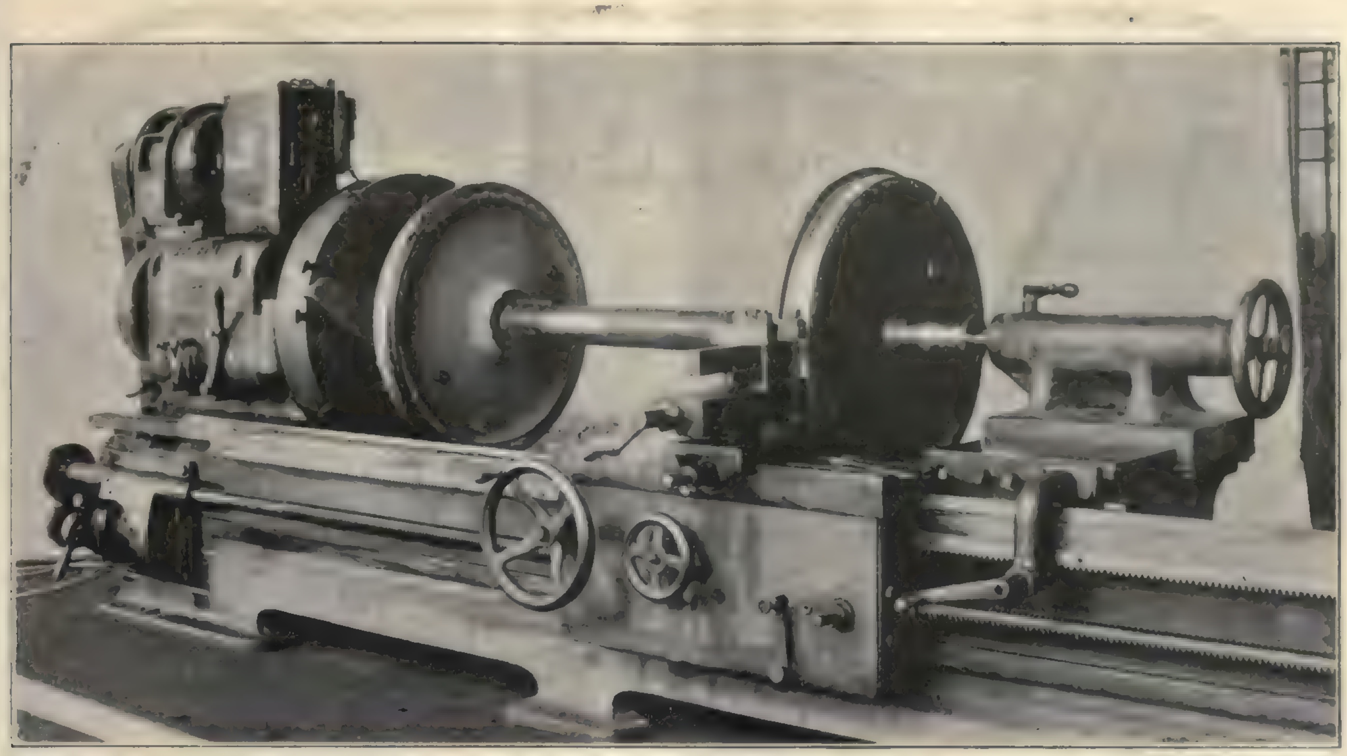


Showing McCabe's *"All-in-one"* Lathe 24-40-in. Swing—turning Car-wheels.

Reducing Maintenance Cost

is your Problem

The answer is the

"All-in-1"

To the shop that is limited by floor space or in equipment purchasing power, ***"All-in-1"*** Lathes provide a solution of the problem of handling the many diverse jobs both as to diameter and range that are encountered in electric railway maintenance.

Not limited by range, rigidly constructed throughout and ***selling at less than one-half the cost of a wheel lathe,*** these machines handle car-wheels and tires of the largest diameters on axles, commutators and similar smaller work with equal facility.

To the large shop, they represent more jobs turned out per day because of their rugged strength and ease of control; to small shop, less idle machine hours because of wider adaptability.

Dropped V-bed construction permits the ***"All-in-1"*** to swing jobs up to 40-in. The 12 spindle speeds give variations which supply the correct cutting speeds for any metal or radius. The speed range is 184.2 to 1.6 r.p.m.

*A letter addressed to 149 Broadway, New York City, will immediately bring you Bulletins explaining the money-saving economies of the **"All-in-1"** Lathe.*

Save your company half the price of a Car-Wheel Lathe

J. J. McCabe Lathe & Machinery Corp.

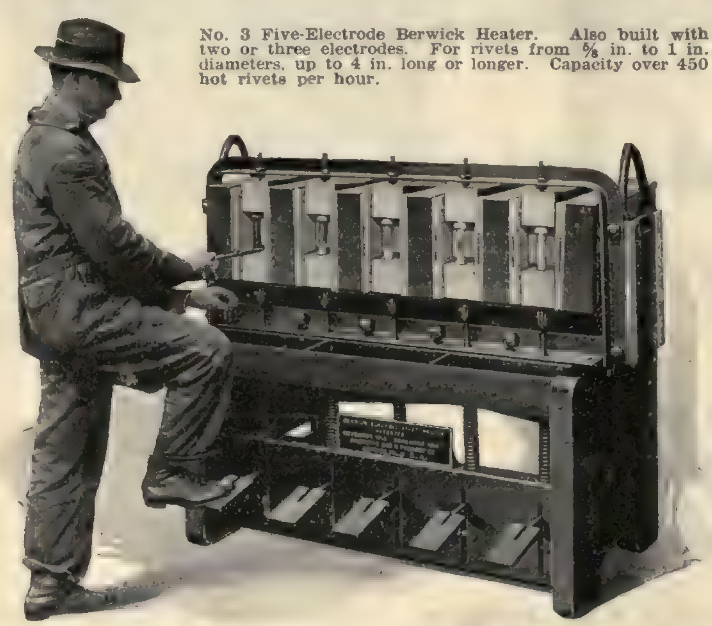
149 Broadway, New York City

First *We* Proved Them

610 now in use

Now hundreds of other manufacturers are proving the day-in-day-out efficiency of Berwick Electric Rivet Heaters

We took no chances in marketing the Berwick Electric Rivet Heater. Before *selling* the Heaters we *used* them—*fifty* of them—in our own shops. We used them continuously for *six years*. After we had convinced ourselves of their worth, and had received numerous requests for them from other manufacturers, the Heaters were offered for sale. That was less than a year ago, and now there are over six hundred Berwick Heaters in operation.



No. 3 Five-Electrode Berwick Heater. Also built with two or three electrodes. For rivets from ⅝ in. to 1 in. diameters, up to 4 in. long or longer. Capacity over 450 hot rivets per hour.

The Berwick heats rivets by passing an electric current through them, one by one, as needed. Various types and sizes are furnished for heating from two to five rivets simultaneously. Within twenty to thirty seconds after the rivet is inserted in the machine it is hot enough for driving. Current is used only when rivets are being heated.

Since each rivet is in plain view while heating, spoilage by burning and scaling is practically eliminated. This saving alone averages 40 cents per hundred pounds of rivets heated.

The Berwick Heater also eliminates smoke, fumes, dirt, and excessive heat radiation. Consequently, it can be placed close to the work (being conveniently portable) without discomfort to the workmen, thus saving time in passing rivets. There is no loss of time due to fumes when starting work indoors, as in the case of coke or fuel-oil furnaces.

The Berwick practically eliminates fire risk, is easy to operate and perfectly safe, has no complicated wearing parts, and operates continuously at almost negligible cost for maintenance.

Send for Catalogue

Please state sizes and quantities of rivets used and alternating current conditions.

American Car and Foundry Company

CHICAGO **165 Broadway, New York** ST. LOUIS

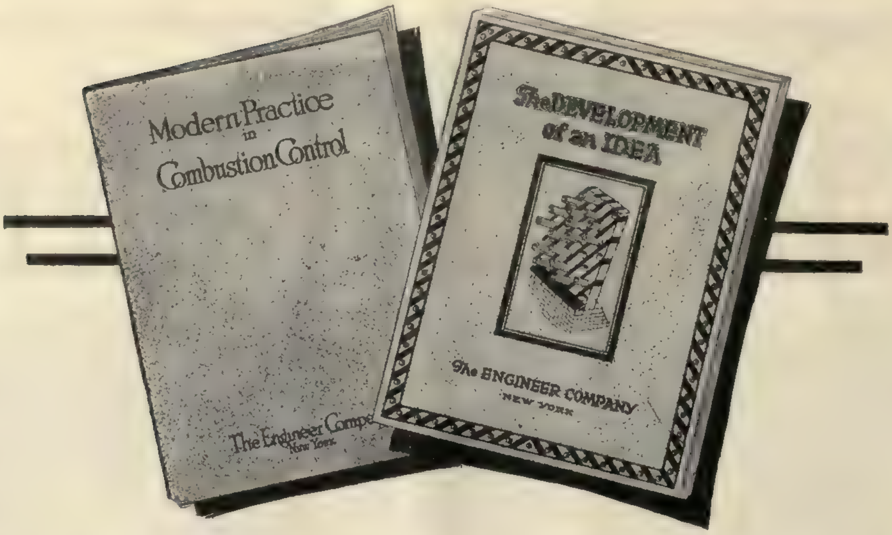
BERWICK ELECTRIC RIVET HEATER

DAVIS STEEL WHEELS

Eliminate Duplication of Labor

When you have gone to the expense of (1) removing wheels, (2) hauling them thru the shop and (3) into the lathe for turning, it's necessary to repeat the second and third operations in order to get them back to the car. To eliminate these excessive costs use Davis Steel Wheels and rely on their one-wear feature to keep them in constant service.

American Steel Foundries
1100 McCormick Building, Chicago


Modern Practice in Combustion Control
The Engineer Compa
New York
The DEVELOPMENT of an IDEA
The ENGINEER COMPANY
NEW YORK

These two books WILL CUT YOUR POWER COSTS

BETWEEN them, these two books cover practically the entire subject of fuel economy and boiler efficiency. They describe the most approved present day methods looking to fuel economy, higher plant capacity, greater reliability, etc. They should be in the library of every executive, engineer or plant superintendent who seeks higher operating standards and lower costs. Your copies will be sent upon request.

Improved Combustion

with

Balanced Draft

Produced exclusively by The Engineer Company

Fuel—its economical and efficient use—is the outstanding power plant problem of the day. The study that engineers have long devoted to the use of steam is now turned to economies in its generation.

"Modern Practice in Combustion Control" is just off the press. It is practically a text book on the latest approved practice in the automatic control of air supply, fuel supply and furnace suction. Sections are devoted to a full consideration of such vital topics as "The Elements of Combustion Control," "The Principle of Balanced Draft," "Prevention of Heat Dilution," "Improved Air Distribution," "High CO$_2$," "Improved Heat Transmission," "Increased Boiler Capacity," "Reduced Maintenance," "Increased Efficiency of Firemen," etc.

How the most advanced combustion practice can be applied to your plant, will at once be apparent when you read this interesting book. The economies possible will be obvious. Your copy of this exceptionally practical discussion is awaiting your name and address.

Using More *of the* Heat

with

Turner Baffle Walls

Produced exclusively by The Engineer Company

Turner Baffles Walls have solved many widely varied boiler problems. The fact that they can be installed at an angle permits adaptation to the design requirements of individual boilers. Thus the correctly tapered pass always can be secured, dead spaces eliminated. the heating surfaces increased and the correct gas velocity ensured. Stack temperatures are lowered when Turner Baffles are installed.

In many instances the adaptability of Turner Baffle Walls has permitted the solution of individual furnace problems, such as reducing slag formation on the lower rows of tubes, correcting draft troubles, depositing cinders in the setting, enlarging the furnace chamber for oil burning, avoiding reflected heat, etc.

Our book "The Development of An Idea" will give you much interesting Baffle information and point the way to economies possible in your own plant.

Sent on Request—Write for Them Today

Ask for Booklets D5 and W15.

17 Battery Place **The Engineer Company** New York City

ATLANTA
Trust Co. of Georgia Bldg.
BOSTON
10 High Street
CHICAGO
1414 S Michigan Ave.
CLEVELAND
515 National City Bldg.

DETROIT
870 Woodward Ave.
INDIANAPOLIS
2506 N Delaware St.
MILWAUKEE
614 Security Bldg.

MINNEAPOLIS
Builders' Exchange Bldg.
MONTREAL
Coristine Bldg.
NEW ORLEANS
847 Barrone Street

PHILADELPHIA
1010 Harrison Bldg.
PITTSBURGH
Jenkins Arcade Bldg.
ST. LOUIS
Railway Exchange Bldg.
WILKES-BARRE
21 Bennett Building

The World's best Lubricants

GALENA QUALITY

TRIGRAM G S O C TRADE MARK

Common Sense

interprets business efficiency as the art of exacting good service without excessive cost.

That GALENA LUBRICATING OILS render good service—exceptional service—is a fact too well known to be disputed—but, what do they cost?

Strange to say, they cost no more than other lubricants made and sold for the same purpose; but still stranger, is the fact that by units of service—mileage and kilowatt hours—they cost far less!

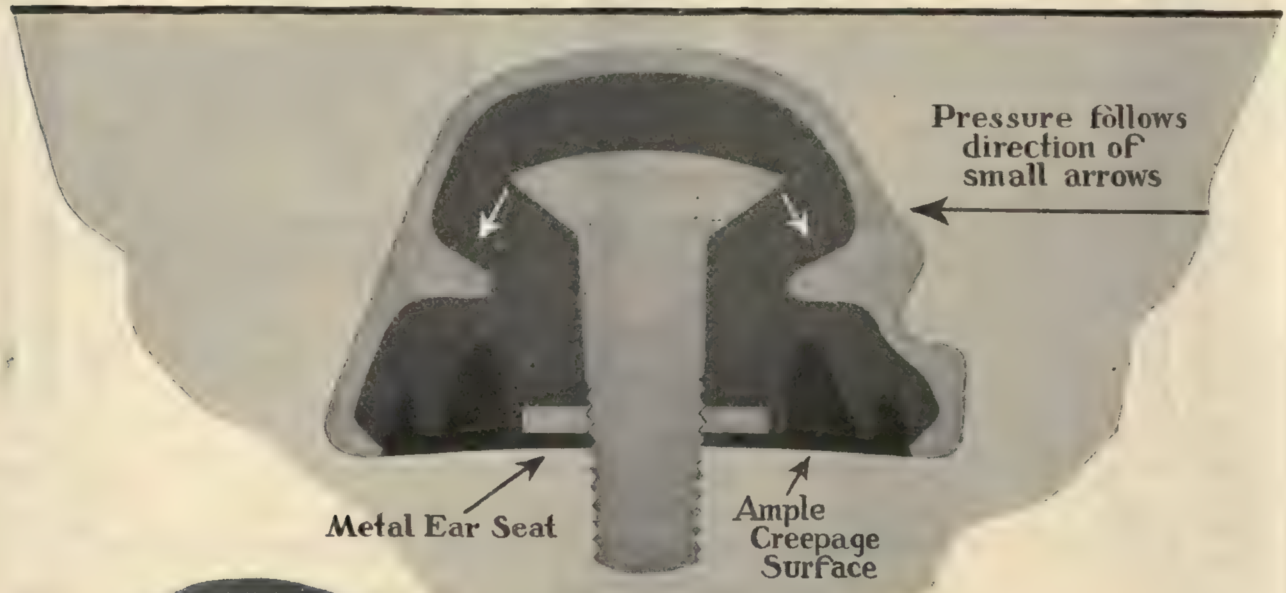
This in itself is a good, sound reason why these oils are in general use on the representative railroads everywhere, but another important factor is the recognition of their ability to save and preserve equipment, a feature that must be considered in lubrication costs, which necessarily should include the expense of repairs and replacements due to faulty lubrication.

When Galena Service Goes In—
Lubrication Troubles Go Out!

THE GALENA-SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
Offices in all principal American Cities
LONDON BUENOS AIRES PARIS

GALENA SERVICE

Durability is not alone a matter of quality of materials—details of construction have an even greater effect upon the life of a product.



The G-E Form H Hanger is designed to give maximum strength

When selecting a hanger for use in the overhead it pays to look closely into the inside construction.

Form H Hangers are built for long life—note the shape of the metal shell as shown in the cross section drawing above. The strain of supporting the trolley wire does not fall on unsupported moulded insulation; sturdy metal projections on the inside of the shell reinforce the compound making the strain one of compression—the bolt cannot pull out in service.

Note also the metal ear seat and ample creepage surface, other superior points of this hanger. The form H, as all other G-E line material, is sherardized by the G-E electric oven process giving positive protection against weathering.

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Don't Forget Those Christmas Seals

AS DECEMBER approaches, we are reminded of the sale of the Tuberculosis Christmas Seals, and the JOURNAL feels it not improper to call the attention of its readers to this humanitarian effort on the part of the National Tuberculosis Association. It may not be amiss to mention that statistics show that one out of every three deaths of men between the ages of fifteen and forty-five is due to tuberculosis. As to the electric railway industry specifically, the association quotes statistics to show that from 1 to 2 per cent of street car conductors, motormen and linemen have tuberculosis in an active stage. Approximately 1 per cent is the figure for office workers and shop men. The economic loss due to decreased efficiency and production of all these men is a direct loss to the railways and the communities served. The National Tuberculosis Association is in the field to help fight this disease. The sale of Tuberculosis Christmas Seals from Dec. 1 to 11 gives to every one an opportunity to support this great national movement.

Can Repair Shop Layout Be Standardized?

THE ideal of the electric railway mechanical department is to keep out on the road every car which is not in the shop for inspection or scheduled overhaul, and the condition of the shop in this respect, barring abnormal conditions such as those of last winter, is an indication of the general efficiency of the management. The degree to which cars can be kept rolling depends in part on the way in which they are routed through the shops. This, in turn, is dependent upon the ideas underlying the shop layout. The writer recently had occasion to visit a large number of shops and was impressed by the wide difference between good shops and poor ones. Some showed that they had been designed really to meet the needs of the maintenance work, others apparently "just grew." The shop where the cars were going through in an orderly manner, where the stock of burned-out armatures was inconspicuous and where neatness stamped the work as having been carefully done was the shop which had been properly planned for its work. The condition of the rolling stock, in general, reflected the condition of the shop.

Now as to this matter of standardization, there are, of course, certain things that must be done to a car to keep it in good running order; while others are desirable they are not absolutely necessary. Each master mechanic has his own ideas as to what he wants to have and do in his shop, but there are certain fundamentals which are the same everywhere. This leads to the question as to the possibility of standardizing upon certain essentials so that the master mechanic and the manager may be sure that they are as nearly up to date in their shop layout as their funds permit.

If anything can be done in the way of standardizing the principles of shop layout, it would be well for the Engineering Association to take the matter under consideration. The work program for 1920-1921, approved at Atlantic City, indicated that a start will be made in this direction. Meanwhile, the management of every property might profitably consider whether improvements could be made locally which would expedite maintenance work. It's a rare shop where some improvement cannot be made. We shall be pleased to receive and print statements regarding economies that have been found practicable even in these strenuous times.

Boston's Problem as Shown by Its Last Quarterly Report

ON ITS face the last Boston quarterly statement, published in this paper last week, is certainly discouraging, showing as it does a deficit over "cost of service" for the quarter of $1,039,147 and for the fifteen months ended Sept. 30, 1920, of $17,080 less or $1,022,067. In addition to this deficit there is $435,348 retroactive back pay, which was paid in October, 1919, but applied to the months of May and June, 1919, and for which no provision has yet been made. All this is regardless of the fact that the company is conservatively capitalized, has had model management over a long period of years and has been providing "service at cost" under public trustees since July 1, 1918, and in spite of successive increases in the fare from 5 cents to 7 cents, then to 8 cents and finally to 10 cents, the 10-cent fare having been established on July 10, 1919.

The official quarterly statement says distinctly that the total receipts per revenue passenger were 10.23 cents, whereas the cost of service per revenue passenger was 11.54 cents, and it points out that the cost of labor alone was 5.71 cents per revenue passenger! The deficit during the last quarter is so large that should the increase in the cost of coal, $239,000 (at $11.50 per ton instead of $5.75), and in maintenance and repairs, $160,000, be eliminated, there would still be a deficit for the quarter of $640,000. Not even the remission of subway and tunnel rental charges paid to city would cancel the deficit, since these totaled $382,555.

Those who have followed the financial fortunes of the Boston Elevated Railway know that beginning October, 1919, or three months after the establishment of a 10-cent fare, receipts began to exceed expenditure and so continued to May, 1920, inclusive except during February. The net result for the year ended June 30 was the surplus of $17,080 previously mentioned. It was then hoped that the succeeding year would enable the company to escape "going on the rates," as the British say of tax-aided municipal systems, even if it could not accumulate the $1,000,000 reserve fund necessary before attempting to lower fares. What is the present opportunity for such an outcome?

A study of the detailed figures of expenses for the quarter shows that the largest item, wages, amounting to 5.71 cents per revenue passenger, is a slightly larger sum than for the previous twelve months, when the figure was 5.053 cents. Yet, as pointed out in the Nov. 8 issue under "Fares Cannot Recede Yet," a cut in wages would work severe injustice so long as there are no substantial cuts in the cost-of-living items that make up the bulk of the family expenses. Besides, arbitrary reduction is out of the question. Manufacturers can shut down their plants and profit thereby because they have a surplus to work off. Hence, today, they are more likely to welcome than to fight a strike against wage reductions. Electric railways have no surplus to work off. Interruption to service can never be made up by the public taking deferred rides. Arbitration toward permitting a lower wage, based upon proof that the cost of living really has fallen, is practically the only way open, but arbitrations take time while deficits hurry.

But there are other reasons why the results for the quarter and for the year are not more satisfactory, and in this connection it would be better to consider the report for the year ended June 30 as a whole, because in Boston the third quarter is always characterized by light receipts and heavy expenditures in track work so that it is low in net. Among these general conditions are the scarcity and high price of coal, already mentioned, the increase in private automobile travel in good weather and the unusual severity of last winter. The fact must also be borne in mind that the narrow streets in Boston and the large extent of subway construction make the city an expensive one for car operations. Thus, the charges paid last year by the company for the use of subways and tunnels amounted to $1,591,-323, which of itself would make a very respectable surplus.

There are, of course, two ways to increase the net in any business enterprise. One is to reduce the expenses and the other is to increase the gross, and some may ask if it is not possible to increase the number of revenue passengers, which for the year ended June 30, 1920, was lower than for any year since 1912 and less by 55,474,000 than in 1917. That is to say, the question naturally arises whether there is any possible way of attracting any considerable number of short-distance riders, presumably the ones lost, who could be carried at a profit at a lower fare if the fare to the long-distance rider would not thereby have to be reduced? To test this possibility the management put in service some time ago several short routes at a 5-cent fare, and of these routes two are still in service. Unfortunately for such a trial the Boston system is not very well adapted for short-route cars, in that its main or arterial lines through the center of the city are underground, where the addition of short-route cars would introduce complications both in fare collection and in making turnbacks. But with cars operating entirely on the surface these obstacles do not exist, and it may be that elsewhere on the system, both in the heart of Boston and in the many self-contained communities in its outskirts, there would be opportunity for such a service.

We trust, however, that the climax has been reached in high costs and low receipts in Boston and that the final quarter of this year will show increased traffic and a satisfactory net for the Elevated. But whether it does or not, the management, in the person of Mr. Dana, has gone on record to the effect that the remedy for decreasing net receipts is not an ever-increasing flat fare. While a property might derive sufficient revenue therefrom out of necessity riding to meet the costs of service, in his opinion it thereby has become diverted from its primary function, which is that of developing community growth and intercourse for the greatest number of the inhabitants in the community, and instead provides a service which can be purchased only by those who can afford it or to whom at any price it is indispensable. We may therefore expect that every effort possible will be exerted in Boston to prevent any further increase in the unit fare.

Fundamentals of Finance and Service

BANKRUPTCY courts and receiverships are not our ideals for utility operation. Such agencies cannot alter facts, and the fundamental fact is that adequate service cannot be rendered at less than cost.

Adequate service is what the public wants irrespective of the financial condition of a utility, but when a receiver is in charge of a property he is wagering his reputation on his ability to improve the financial condition of the utility without primary consideration of service to the public.

Every community can, if it wishes, pay a return to a private utility enterprise which will enable experienced utility operators to render adequate service; every community can drive its utilities into the bankruptcy courts and on into the hands of a receiver, with the result that service is ruined and the going value of the property highly depreciated, or every community can own its utilities and throw the financial burden on the taxpayers and the operating burden on the politicians.

Whatever the procedure, some one must pay the bill. There are no short cuts in utility operation, and the public has the ultimate decision as to the course it takes. But the wisest course is to recognize that poor service in the end is the most expensive to both community and company.

Creepage of Railroad Rails

AT THE meeting of the American Society of Civil Engineers held on Nov. 3 Dr. J. A. L. Waddell, the noted specialist in bridge design and other branches of civil engineering, presented a paper on creepage of railroad rails. This subject is one which may well receive the attention of engineers of way of many electric railways.

The phenomenon of rail creepage is one that has puzzled track engineers ever since railroad tracks were first used. Its causes have long been in doubt, but obviously the primary cause is traffic, since idle tracks show no creepage.

The troubles caused by rail creepage are both numerous and costly, while there is also an element of danger attendant upon its occurrence, which directly affects the lives of the traveling public. Our observation indicates that creepage, though prevalent, is not so serious in electric railway tracks as it is upon steam railroad tracks; nevertheless, it is found in all open tracks electrically operated, whether these be located in subways, on elevated structures, in roadbed or on private right-of-way. That it is not found in tracks in street pavements is due to the retardation or frictiona resistance given by the pavements, which resistance also prevents trouble with welded rail joints.

Dr. Waddell, in his A. S. C. E. paper, opens up thi subject for discussion. The editors of this paper desire to be of assistance to him in his study of means for overcoming the trouble and have reprinted in this issue the questions sent out by the doctor in a questionnaire. We should be pleased to print any answers to these questions bearing on electric railway experience which our readers may forward. Dr. Waddell states that he will furnish copies of his paper to interested engineers so long as the supply holds out.

You Can Lead a Mule to Water, but——

MASS transportation is a human as well as an engineering problem, and in the modern city, with its mammoth but vigorous swarm of human bees, the human element is a deciding factor in planning transportation.

Large city transportation systems are chaotic, but the cities are in the same condition—like Topsy, they both just grew. A realization of this condition and of the nuptial relationship of city planning and transportation is now existent and a tendency toward co-ordination is in evidence.

As an engineering project, a competent committee could co-ordinate existing transportation agencies, *i.e.*, the rapid transit electric, the suburban steam, the street railway and the motor bus, in such a manner as to carry the traffic adequately and could allocate to each agency its place in the general scheme. But this co-ordinated transportation plan might fail unless it considered the human elements of the problem.

A primary factor in transportation psychology is speed. Apparently, no agony or discomfort is too great to suffer provided three minutes in time can be saved in going to the office or in returning home. Those who have experienced the rush-hour conditions in subway or other rapid transit agencies can appreciate the absolute speed mania of the metropolitan. The word "express" creates a riot and produces a greater physical and mental stimulus than booze ever did. It enables people to submit to crushed corns with smiling faces and produces a giant's strength in the sharp elbows of diminutive maidens. A luxurious Pullman, if two minutes slower, would not tempt even a crippled straphanger in the express.

Another fetish of the rider is the "through train." He does not like to transfer from elevated to subway or from surface car to motor bus; once located in a transportation agency going in his direction he hibernates until he reaches his destination and any change en route arouses his bearish ire. He may even take a local instead of an express if the latter involves a ransfer.

Did you ever compare the Sunny Jim smile and hear he sigh of contentment from the man in front of you as he subsides in his seat after readjusting the window o his satisfaction with the apoplectic countenance, mpotent wrath and sibilant expletive of the man across he aisle whose window is immovable? Then, again, how some people do like to push the button on the signal ystem and how they do kick if it doesn't happen to ing the bell.

A more irascible, impatient and unthinking being han the average metropolitan rush-hour rider cannot be found, and in this modern political age he must be humored and petted, not driven.

Get the City Editor's Point of View

WE HAVE been impressed by several recent remarks or statements that the electric railway managements as a rule do not have an adequate conception or appreciation of the psychology of the general public. These statements have come from men whose opinion deserves respect. Among them are public service commissioners who are continually dealing with the public relations of railways and also several public relations representatives or enterprising publicity men of the railways themselves. None from whom such expressions have come has any purpose other than sympathetic constructive criticism. The remedy suggested is to get the "city editor's" viewpoint.

There has been at no time any intimation that railway men are averse to knowing the public, but on the contrary an appreciation that the railway men are eager to have the public understand the problems of railway operation. The question resolves itself into the very practical one of exactly how to do it, a question which has had no end of discussion, but one upon which new suggestions are always welcome. One commissioner, Judge Clyde M. Reed of Kansas, says that we must recognize that the general public as a whole is unreasonable and must be treated as an unreasonable group. Public utility men, he says, appear to treat the public as if it were intelligent and knew or could appreciate almost as much about the nature of the business of furnishing public utility service as do the utility men themselves. This, he says, is false.

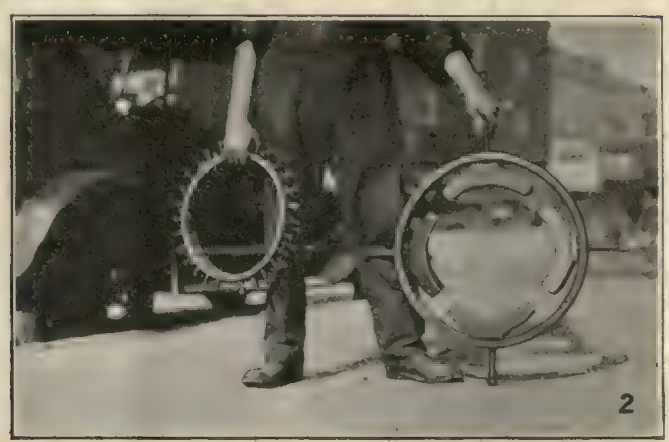
Himself a newspaper man, Judge Reed likens his business to a public utility; at least as a near approach, in that it deals with a larger proportion of the public than any other business. By painful practical experience he has learned that the public's characteristics are as he outlines them. He, and others of experience, urge the railway men to get the city editor's point of view, to study mass psychology, which Commissioner E. I. Lewis of Indiana says is not now included in the curriculum of a public utility employee.

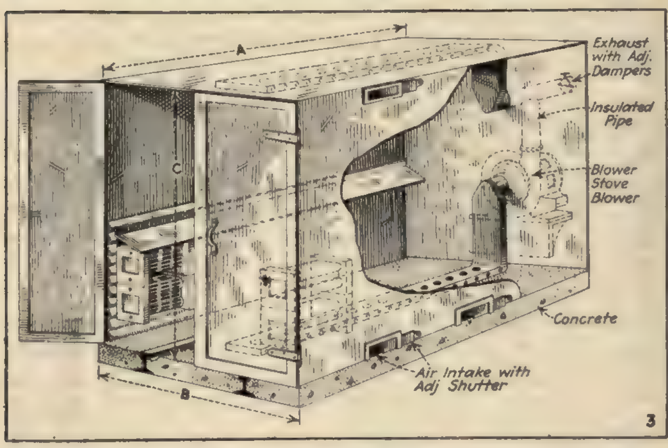
What viewpoint is this which the city editor has and which the electric railway man should acquire if he does not have it? Principally, it seems, the city editor has been talking to the public so long and has felt so directly the reaction to his kind of talk that he has learned the language of the general public. He has learned a good deal about what the public thinks and wants to know. It may not please electric railway men, who have been dealing with the public for years, to be told that they don't know its characteristics.

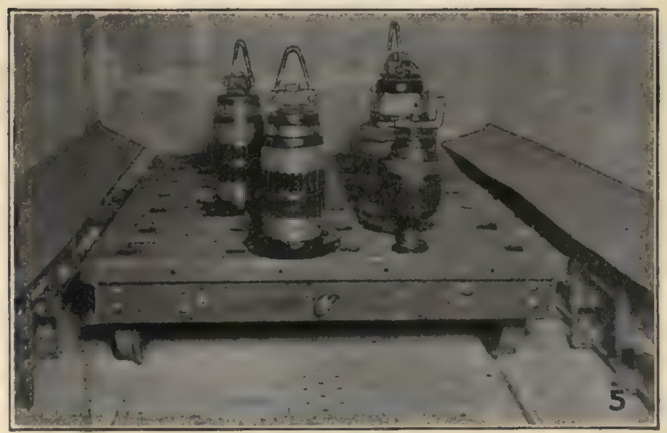
But let it be pointed out that the relation of the electric railway man to the public in the past has been chiefly through the medium of service and fares and in noting the public's reaction to this and the consequent effect on gross and net receipts. Today we all say that there are new elements and methods in the business and these are chiefly concerned with publicity and public relations—principally education of this public in the details of the electric railway business.

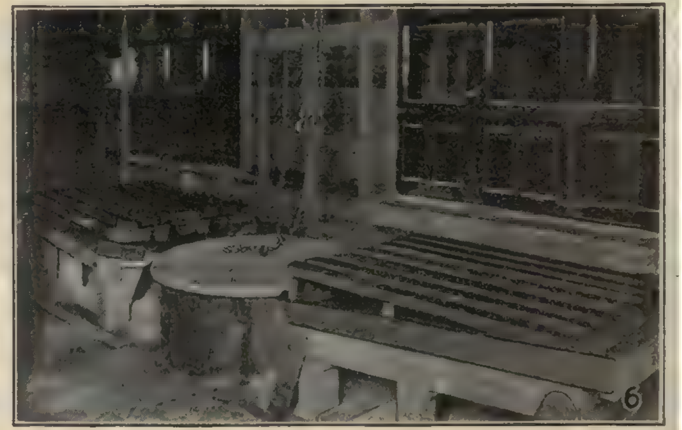
So, say these advisers, get acquainted with the city editor. Learn what he knows about the public and its attitude. At the same time, be sure he becomes fully educated on electric railway problems himself and he will become an agent for the correct portrayal of electric railway matters to the public and also an interpreter to the railway man of the public's attitude.

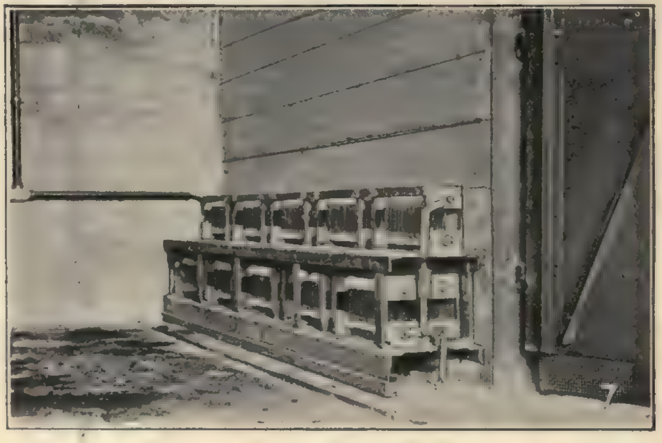
Novel Apparatus and Methods for Maintaining Electric Railway Equipment











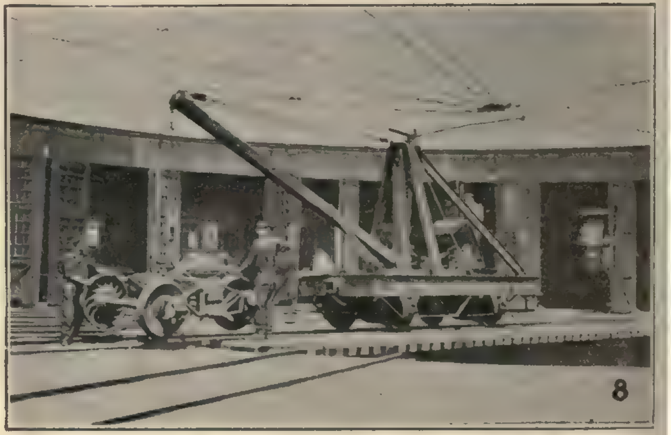


Fig. 1. Steam-heated sand drier installation in the Sioux City, Iowa, shop.

Fig. 2. Two devices rigged up in the Sioux City shop to facilitate the banding of armature coils.

Fig. 3. Isometric drawing of new bakeoven as recently installed in Omaha shops.

Fig. 4. New bakeoven at Omaha, showing ventilating duct in floor and ceiling and recording thermometer suspended from ceiling.

Fig. 5. Interior of Omaha bakeoven, showing car used for moving armatures in and out of the oven and manner of supporting armatures in vertical position.

Fig. 6. Dipping tank in the Omaha shops with drain rack on either side made movable to permit putting cover on tank.

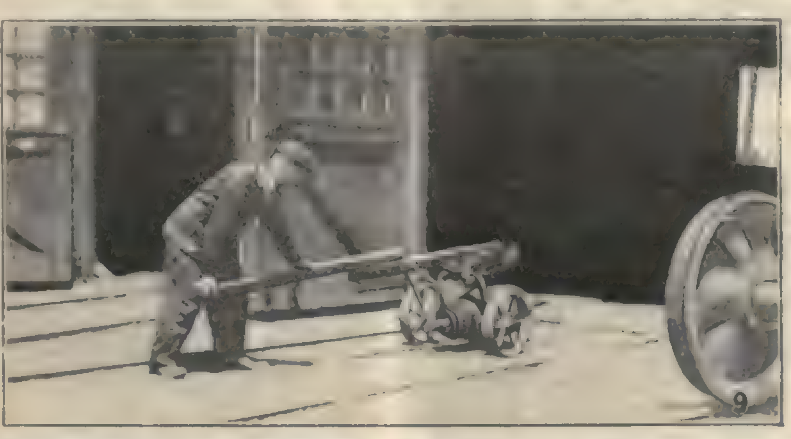
Fig. 7. Interior view of the concrete bakeoven in the Waterloo, Iowa, shops.

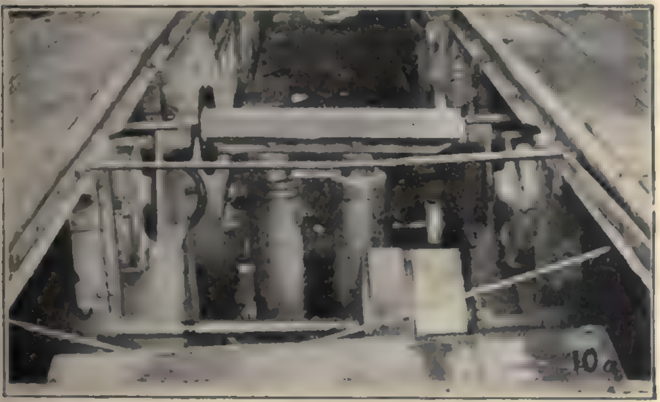
Fig. 8. Handy home-made derrick used for lifting and shifting anything at all about the shops of the Waterloo, Iowa, company

Picturing Iowa Shop Kinks

Various Stereopticon Pictures of Shop Equipment Shown and Discussed at the Recent Omaha Meeting of the Iowa Railway Association

IN ADDITION to the pictures taken to accompany papers presented at the recent Omaha meeting of the Iowa Electric Railway Association, and reproduced with the report of the meeting in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 25, 1920, a number of other pictures were shown as a means of urging master mechanics to describe interesting kinks in use in their shops. These are presented herewith, together with a brief description. C. M. Feist, master mechanic Sioux City Service Company, explained the accompanying picture of the sand drier, Fig. 1, used at his shop. The wet sand is shoveled into the drier through a window in the wall to the rear. As needed, the sand is moved forward in the drier to the portion of the bin which is heated with steam pipes. To begin with, it required twenty-four hours to dry 7 cu.yd. of sand. Later it was found that by pushing a broomstick down through the wet sand at numerous points the evaporation of the moisture was much more rapid and 7 cu.yd. of sand could be dried in twelve hours. The twenty-four-hour time required before this practice was started seemed to prevail whether the drying was done with the drier open or closed. After the sand in this drier has become thoroughly dried it is removed at the bottom by pulling out the series of iron slides seen along the lower front edge of the furnace, each slide having a loop handle.





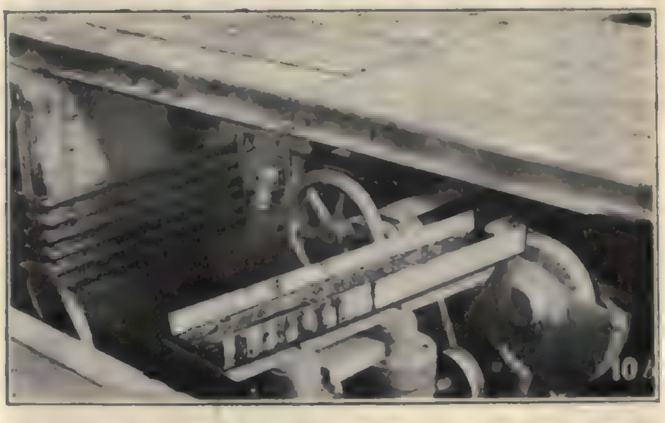
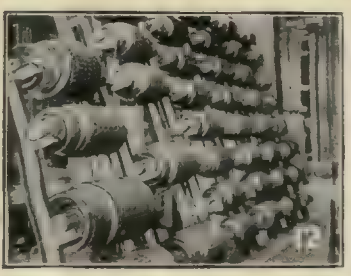
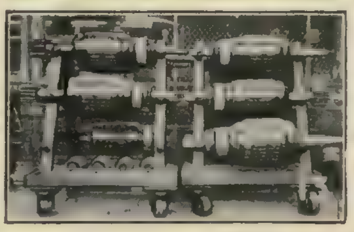
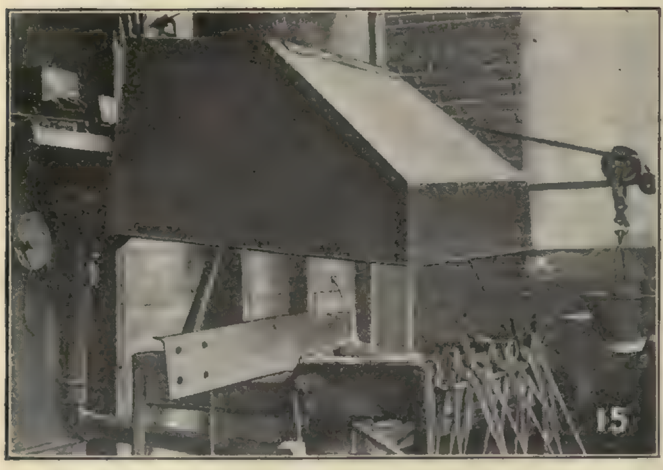


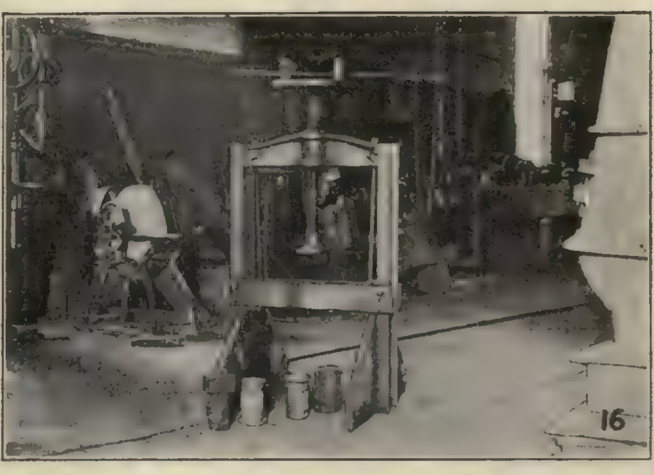
Fig 9. The Waterloo "mule" found very convenient in transporting armatures. Figs. 10a and 10b. Two views of the hydraulic jack and pit wheel grinder in the Des Moines shops

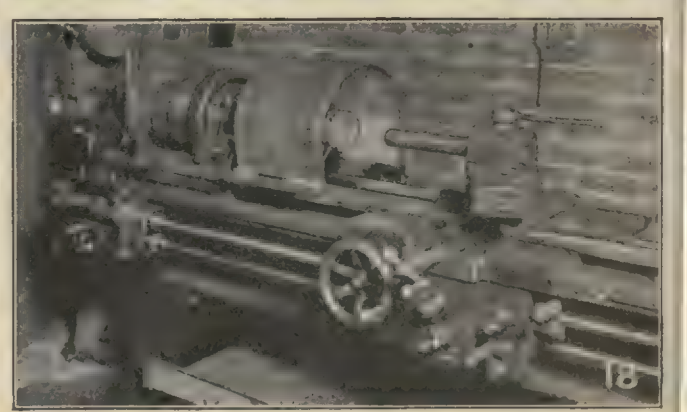
Another piece of equipment from Sioux City that was pictured is used in putting in new armature coils, and another for holding the coils while banding, Fig. 2. The first of these consists of a steel ring ½ in. by 3 in. containing two rows of setscrews laid out to correspond with the slots in the armature. This device is used to force the coils down into the slots solidly and hold them there until they are banded. Caution is taken not to clamp the coils too hard, as this might cause a short circuit, but by forcing them hard against the bottom of the slots all vibration is eliminated. A piece of key stock which fits into the slot is placed between the coil and the setscrew to avoid breaking the insulation as the setscrew is screwed down. The banding of armatures has been done cold up to the present, but it is expected to do it hot in the future. The other device shown in this same picture and having four setscrews and four curved clamps is used to hold the ends of the armature coils while the banding is being done. One of the things which created a great deal of interest both at the Omaha shops on an inspection trip and in the meeting where it was pictured was the new bakeoven recently installed there. An isometric drawing as well as pictures of this oven are shown herewith, Figs. 3, 4 and 5. This oven was laid out according to recommendations made by the Westinghouse Electric & Manufacturing Company. It is built of wood and measures 10 ft. wide by 12 ft. high and 14 ft. long. The walls are made up with 2 x 4-in. vertical members, on the outside of which was placed a layer of 2-in. Johns-Manville thermo fire felt in 24 x 36-in. sheets. On the inside of these two-by-fours were placed two layers of ½-in. Flax-li-mum in 30-in. x 9-ft. sheets, the two layers separated by 1 x 2-in. furring strips placed opposite the 2 x 4-in. studding. This construction left air spaces betwen the two inner linings and the outside lining of the heat insulating material. This same construction was used for the ceiling and for the double doors opening into the end of

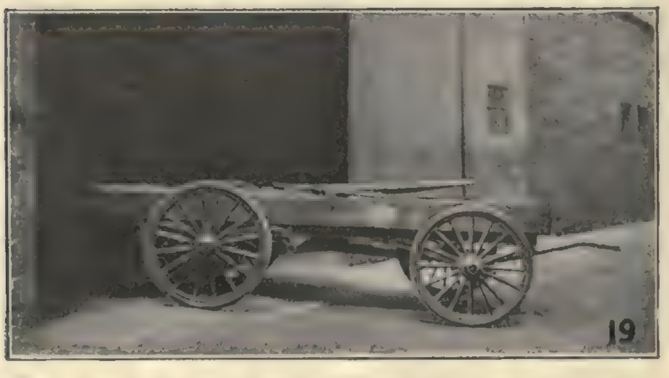












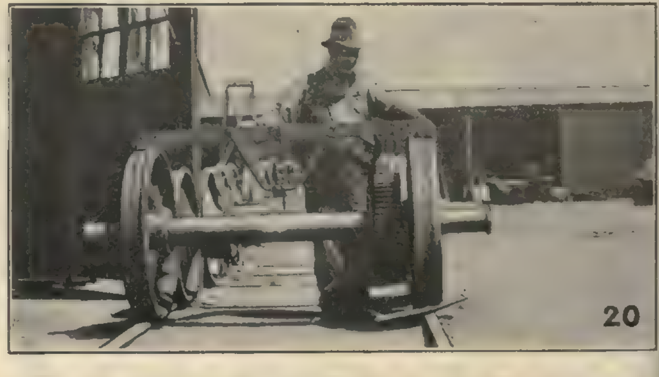


Fig. 11. Transfer table at the Omaha shops equipped with motor-driven "niggerhead" for moving dead cars.

Fig. 12. Method of storing extra armatures at Des Moines.

Fig. 13. Armatures in the Tri-City Railway shops are stored on castor-equipped racks for ready transport from storage to motor assembly room.

Fig. 14. How extra armatures may be neatly stored in the small shop at small expense.

Fig. 15. Counterbalanced hood over blacksmith forge in the Centerville, Iowa, shops.

Fig. 16. Bearing press made out of old cider press in the Centerville, Iowa, shops.

Fig. 17. Small electric oven for warming coils just prior to installation in armatures, Tri-City Railway shops.

Fig. 18. Protection for the eyes of the machinist while boring out brass bearings.

Fig. 19. A handy trailer used in Des Moines for transporting tools and materials.

Fig. 20. Wheel gage used in Waterloo to insure that the wheels shall be pressed on at equal distances from the axle center.

the oven. These doors were faced on the beveled edges with an asbestos rope so that they are as heat proof when closed as the walls.

BLOWER KEEPS AIR CIRCULATING

One of the most interesting features of this oven is the ventilating system. This consists of a small blower which is connected with a ventilating duct along the ceiling of the oven and another installed in the floor. This blower can be made simply to keep the air circulating from the blower through the top duct, down through the oven and returning through the bottom duct to the blower, or by simply adjusting a damper in the blower exhaust pipe the air and gases from the oven may be exhausted outside. When the baking of armatures is first begun it is necessary to exhaust the naphtha gases out into the open to avoid the possibility of an explosion, for an accumulation of these gases might be ignited by the red hot elements of the heaters.

The oven is heated by two sets of heaters, one installed on either side of the oven, on the floor, and protected from above by a steel apron. The temperature within the oven is regulated automatically and is recorded by a recording Bristol thermometer. The temperature to be maintained during any heat is adjustable and is usually made 210 deg. F. for small armatures and 260 deg. F. for the large armatures. The thermometer control permits a variation in temperature of 5 deg. either way from the setting. For each heat a new chart is placed on the recording thermometer, on the back of which is entered the serial number of the apparatus placed in the oven for that heat, and the thermometer then records graphically the exact temperature which prevailed during that heat, so that in the case of any armature failure a check may be made to determine that a proper oven treatment was secured. This also forms a check for the men operating the oven that a proper heat is being maintained.

This graphic recording thermometer, the floor switch, the control switch and the main and sectionalizing switches for the two sets of heaters are all mounted on a standard switchboard panel placed at one side of the oven. The Omaha oven had not been in use long enough at the time of the meeting to determine any operating results, except that considerably better service from the armatures thus prepared was indicated. Armatures are heated over night before dipping and then baked from twenty-four to thirty-six hours.

NOVEL DRAIN RACK CONSTRUCTION

Another interesting part of the equipment used in conjunction with this Omaha bakeoven is the pair of drain racks and dipping vat installed adjacent to the oven. One of these racks was placed at either side of the vat and arranged so that the drippings from armatures laid on them will drain back into the vat. These racks were built with a toggle joint so that they could be hinged back away from the vat in order to make it possible to put a cover on the vat when not in use and thus prevent the rapid evaporation of the dipping fluid. This arrangement can be readily seen in an accompanying illustration, Fig. 6.

W. G. Lamb, Waterloo, Iowa, spoke briefly of the 50-kw. baking oven used in his shop, Fig. 7, which has 8-in. concrete walls, floor and ceiling and insulated steel doors. It measures 10 x 12 x 14 ft. Only natural ventilation is provided, there being openings in the doors and louvres along the sides at top and bottom. The temperature is thermostatically controlled. This oven has so improved the service given by armatures that one man is now able to do the work which formerly required three armature winders in maintaining the 267 machines in use on that property.

Mr. Lamb also described the small derrick car, Fig. 8, which he has found exceedingly useful about the shop. It was constructed entirely of parts removed from old equipment. The underframe is 20 ft. long, the mast 8 ft. high and the boom 26 ft. long. The car weighs 15 tons and it will pick up and swing a 5-ton load. In fact, it will lift considerably more than its own weight will hold down, and for this reason the back end has been provided with anchors for use when it becomes necessary to lift an unusually heavy load. The weight at the rear end of the car was also made as great as possible by mounting the motor on this axle on the outside, while the motor on the forward axle is mounted on the inside. This small derrick car is also equipped with a third motor which operates the hoist and swings the boom, and it has been found very useful in handling wheels and axles, trucks and for various work about the shop. It has even been used for handling special trackwork on the street in a few cases.

In this same picture, incidentally, is shown the turntable which serves the shops of the Waterloo, Cedar Falls & Northern Railway. To overcome the necessity for calling three or four men out of the shop to move the turntable when it is necessary to change its position Mr. Lamb installed an old 12-A motor on it so that it could be moved by power.

In Fig. 9 is seen the Waterloo "mule," which has been found very convenient for transporting armatures about the shop. Its simple construction is readily seen from the picture without description.

PIT GRINDER SAVES TIME

Fig. 10 shows two views of the pit grinder used in Des Moines for truing up slid flat wheels. The yoke across the top of the two hydraulic lift cylinders fits over the axle bearing housings so that the pair of wheels to be ground can be held in a firm position while they are being revolved by the car motor. As the jack raises the pair of wheels up off the rails the short section of rail on either side is taken out and the emery wheels moved up in contact with the car wheels. The latter are then driven in one direction while the emery wheels are driven in the opposite direction by a separate motor mounted in the pit as shown in the illustration.

The showing of these pictures aroused some discussion, in which it was brought out that the advantage of the pit grinders is that wheels can be ground in about the same time that is required when they are put in a lathe, but the time of taking the pair of wheels out from under the car and replacing them is saved. It was also brought out that screw jacks are used in some shops instead of the hydraulic jacks. When running the car motors during this grinding process, Mr. Feist stated that he makes use of a water rheostat to reduce the voltage from 600 to about 110.

Fig. 11 was taken for the purpose of showing the "niggerhead" installed on the transfer table at the shops of the Omaha company. This is found to be very handy in pulling dead cars on and off the transfer table without the need of getting another motor car to do this shifting.

Figs. 12, 13 and 14 show the methods employed to store armatures in the shops of the companies at Des Moines, Davenport and Centerville, respectively. At Davenport they are supported on a frame mounted on ball-bearing castors, which facilitates their handling. By pushing the frame to the point where a motor is being reassembled only one hoist-handling of the armature is necessary in removing it from its storage position and lowering it into the motor frame. Fig. 14 affords a good illustration of how a small shop can take care of its extra armatures in a neat manner with little expense.

Fig. 15 shows an adjustable hood mounted over the blacksmith's forge in the shop of the Iowa Southern Utilities Company, Centerville, Iowa. In this small shop it is sometimes necessary to heat a very heavy piece in the forge. The consequent necessity to build up a big fire formerly filled the shop with smoke and made working conditions disagreeable. This was overcome by installing this hood, which is let down closely over the fire during a heavy heat and then raised out of the way when the heat is completed. The hood is counterbalanced so that it is easily raised or lowered.

In Fig. 16 is shown what was devised by Charles Wells, master mechanic Iowa Southern Utilities Company, Centerville, as a substitute for a bearing press when money was not available for the purchase of a much-needed tool. He purchased the head and screw of an old cider press from a junk dealer and mounted this between two channel-iron supports and thereby devised the press, which has worked out very satisfactorily for the small amount of this kind of work to be done in this small shop.

COILS HEATED TO PREVENT CRACKING

In Fig. 17 is pictured a small electrically heated warming oven which has been found to be of great value in the shops of the Tri-City Railway, Davenport, Iowa. It was found that after armature coils lie in storage for a long period they become rather stiff, so that the fabric is very easily cracked in installing the coils. By putting the coils in this warming oven for ten or fifteen minutes just prior to installation the insulating compound is softened and injuries to the fabric are avoided. The oven is heated by one electric car heater. It is made of sheet steel large enough to hold a bundle of coils and is mounted on legs which bring it up to a convenient height for the armature winder. It is portable, so that it can be moved to any position in the armature room where work is taking place.

The picture of Fig. 18 was taken simply to show the means devised in the Omaha shop to protect workmen from flying chips while boring out brass bearings. This consists of a semicircular steel frame supporting a heavy wire mesh and resting on the lathe bed. By watching his work through the screen, the machinist is fully protected from possible injury to his eyes.

Fig. 19 shows a rubber-tired utility trailer which has been found to be very handy in Des Moines. Tools, materials, etc., can be loaded into it and hauled behind a truck or work car to any particular job, where the trailer can be detached and placed at a convenient point to the work.

Fig. 20 shows the gage used at Waterloo to insure that car wheels shall be pressed on at equal distances from the axle center. The axles are prick-punched at the center and this forms the gage mark to which wheels are subsequently pressed on, making use of the convenient gaging device pictured.

Other pictures shown and discussed at the Iowa convention which have already been published in the ELECTRIC RAILWAY JOURNAL were the following:

Adjuster for installing the springs on gear case covers, page 566, issue of Sept. 20, 1919, as developed at Des Moines.

Reclaiming worn axle bearings in Des Moines, page 565, issue of Sept. 20, 1919.

Shop carriage for fenders, Davenport, page 925, Vol. 54, No. 20, dated Nov. 15, 1919.

Wheel pressing a one-man job in Davenport, page 161, issue of Jan. 17, 1920.

Trolley wheel truing with self-centering chuck, page 374, issue of Aug. 21, 1920.

Unusual Cause for Broken Axle Bearings

AN ELECTRIC railway company with a considerable number of old-type motors on its cars decided to replace these with a modern interpole type. The cars on which this change was made were of a double-truck type and the motors which were used to replace the old type were made by a different manufacturer than were the original motors. Shortly after the re-equipped cars were put in service a considerable amount of trouble developed from worn and broken axle bearings, broken gear cases and broken armature shafts. The railway company's forces were unable to locate the cause of the trouble and so the manufacturer was called upon to determine why the motors would not satisfactorily perform the service. A careful study of the trouble encountered was made and a compilation of results showed that at least 90 per cent of the trouble was with No. 2 motor, while No. 1 motor seemed to give very satisfactory service. Both motors were mounted upon one truck of the car and the other truck was used as a trailer.

One of the cars was given a test run with the trap doors open to permit watching of the operation of the motors. It was found that in notching up the control and while going into transition from series to the parallel position the No. 2 motor gave an unusually severe kick, which apparently subjected the parts of this motor to severe mechanical strains. This condition was checked up by running the car in both directions and while operating the controller from either end of the car. The results were the same in all cases.

With this information at hand the electrical department checked up the current peaks as they occurred on each notch of the control and while changing from the series to the parallel position. It was found that the grid resistors, which were arranged for the old-type motors, required rearrangement in order to give proper stepping with the new equipment. This rearrangement was made and further tests showed that the severe kick had been eliminated. Further service with the equipment changed showed that this had been the cause of the trouble as the repeated breakage of bearings, shafts and gear cases stopped.

An investigation to determine the stresses in steel car wheels, similar to the work recently completed on chilled iron wheels, has recently been undertaken by the Bureau of Standards, Washington, and tests on six of the wheels were completed during October.

Copper, Zinc, Tin and Their Alloys

The General Use of These Metals and Their Alloys by Electric Railways Is Covered, Together with Examples Taken from Various Specifications

BY NORMAN LITCHFIELD

COPPER is, without doubt, the one material which differentiates electric industries from all others. While on the one hand it is the metal which history shows was the first to be used by man, on the other its greatest demand came with the development of the use of electricity. This is because copper holds in a marked degree the combined qualities of low resistance to the passage of an electric current, high ductility, permitting it to be drawn into wire, little or no tendency to corrode by atmospheric action and comparative inexpensiveness.

The steam railway gets along very well with a comparatively small amount of copper, its chief dependence being on iron and steel, but an electric railway without copper is unthinkable.

At the present time copper is divided commercially into two chief grades, *viz.:*

1. Lake copper, which is obtained from the Michigan mines.
2. Electrolytic copper, which is obtained by an electrolytic process from the ores found in the Western states.

A third and lower grade is that known as "Casting Copper," made or recovered largely from brass foundries.

An interesting note on this customary classification is given in the A. S. T. M. specifications for lake copper, reading as follows:

> These specifications have been drawn to cover the peculiar trade situation which has classified the large production of copper from this geographical district as a product in a class by itself. It is realized that a better classification from an academic point of view could be made by method of production or by chemical composition, but the trade does not yet seem ready for such a step.

For electric railways copper (unalloyed) is used most largely in the form of wire, and to a lesser extent as bars and castings.

High Conductivity Is Important

The all important quality for electrical purposes is its ability to carry current, or its conductivity, and as this feature depends upon the purity of the copper, *i.e.*, its freedom from other elements, the grade of the copper is really rated by this quality, although it is customary to allow any percentage of silver, as the latter's qualities of ductility and conductivity are equally as good as those of copper. The simplest way of determining this purity is by measuring the resistivity, and this method has come into general use in recent years, as is fully explained in a note appended to the A. S. T. M. standard specifications for soft copper wire:

> Electric conductivity was formerly expressed as a percentage on the basis of determination made by Matthiessen about 1865 of the electric resistivity of supposedly pure copper. Since that time the methods of refining copper have advanced, so that it is not uncommon to find copper of more than 100 per cent conductivity on the Matthiessen basis. There has until recently not been international agreement on the electric resistivity of copper to be considered the standard for the expression of conductivity. While international agreement upon the value 0.15328 ohm per meter-gram at 20 deg. C. for the resistivity of copper equal to 100 per cent conductivity was reached by the International Electrotechnical Commission in 1913, it has been deemed preferable to express the requirements in standard specifications in the terms of quantities directly measurable, rather than by reference to some quantity whose standard value is the subject of agreement only. The use of the arbitrary term "conductivity" has no more warrant than the employment of arbitrary gage numbers. Therefore in these specifications the requirements are stated as the maximum rejection limits to the resistivity.

Lake copper is again divided into two subgrades: (1) Low Resistance Lake and, (2) High Resistance Lake.

According to the A. S. T. M. standard specifications, Low Resistance Lake wire bars are required to have a resistivity not exceeding 0.15535. Ingots and ingot bars are permitted to have resistivity not exceeding 0.15694. High Resistance Lake has a resistivity greater than 0.15694.

All the above figures are given in international ohms per meter-gram at 20 deg. C. (annealed). The purity of the Low Resistance Lake is required to be at least 99.880 per cent, silver being counted as copper. The High Resistance Lake is required also to have a purity of 99.880 per cent, but in this case silver and arsenic are both counted as copper. In both cases the purity is to be determined by the electrolytic assay. Electrolytic copper is required to have the same qualities of purity and resistivity as the Low Resistance Lake copper.

Mechanical Properties of Copper Discussed

Aside from the purely electrical features already discussed, certain mechanical properties are of importance in the successful use of copper in electrical industries. Chief among these are the tensile strength and the ductility.

Copper has a tensile strength running from about 35,000 lb. per square inch in the annealed state up to over 60,000 lb. per square inch in the smaller sizes of hard-drawn copper wire. This quality is largely affected by drawing, the tensile strength running from 49,000 lb. per square inch in a wire of 0.460 in. diameter up to 67,000 lb. per square inch with diameter of 0.040 in. The elongation reduces naturally from 3.75 per cent in the first case to 0.85 per cent in the other.

The necessary selection must be made of the proper physical qualities for the particular purpose in hand. Thus ordinary insulated wire and cable must be flexible and hence require copper having a tensile strength running from 36,000 to 40,000 lb. per square inch, with an elongation in 10 in. of from 30 to 10 per cent. Other properties of this grade of wire are given in the A. S. T. M. tentative specification for tinned soft or annealed copper wire for rubber insulation, Serial No. B 33-19 T. The resistivity reduced to pounds per mile ohm at 20 deg. C. runs from 938.20 in the smaller sizes (0.003 to 0.011 in. diameter) to 896.15 in the larger sizes (0.460 to 0.290 in. diameter).

On the other hand, trolley wire necessarily demands the use of copper of considerably greater strength.

Thus, in the A. E. R. E. A. standard specification for round and grooved high conductivity trolley wire physical properties are required as follows:

Area, Circ.mil	Tensile Strength, Lb. per Sq.In. Min.	Max.	Elongation in 10 In., per Cent
211,600	49,000	53,000	3.75
168,100	50,000	54,000	3.25
133,200	51,600	56,000	2.80

The specification further requires a twisting test, "for the purpose of determining defects which may be prejudicial to the life of trolley wire, owing to its peculiar service, as compared to that of copper wire for other purposes," as follows:

Area, Circ.mil	Twists in 10 In.
211,600	8
168,100	9
133,200	10

The wire is required to be "twisted to destruction and not to reveal any seams, pits, slivers or surface imperfection not consistent with the best commercial practice."

The effect of tinning copper wire is given in the A. S. T. M. specifications: "The coating of tin on copper wire is for the purpose of protecting the copper against the action of the rubber insulation. It is therefore necessary that the coating be continuous. The test in a sodium-polysulphide solution is therefore prescribed for the purpose of determining whether or not the wire carries a continuous envelope of pure tin. Under the same conditions of tinning the coating on all sizes of wire, excepting on fine wire, is approximately the same. The coating on fine wire is generally relatively heavier than that on coarse wire.

"It has been found that the tin coating on copper wire consists of two parts, an envelope of pure tin on the outside, with an intermediate layer of copper-tin alloy. This tin alloy, as well as the amount of tin present, has an effect on the resistivity of the wire. Since the relative amount of tin coating and alloy is greater on the small wire than it is on the coarser wire, the resistivity of the wire increases as the size decreases. This also accounts for the decrease in elongation due to tinning soft wire."

The foregoing covers in a general way some of the chief uses of pure copper in the railway field. The next consideration is the use of copper in some of its alloys.

COMPOSITION OF BRASS AND BRONZE

Brass consists of copper and zinc and is probably the most widely used alloy of copper. The composition should always be borne clearly in mind in order that brass be not confounded with the other important material, bronze, which is an alloy of copper and tin. The terms are quite generally mixed up in common use, a notable instance being the use of the term "journal brass," the metal of which in reality is an alloy of copper, lead and tin. A great variety of brasses are made having varying proportions of copper and zinc, the ordinary alloys running from a minimum of about 55 per cent copper up to nearly 100 per cent.

The color of the resulting alloy varies with the amount of copper contained therein, and hence it has always been more or less customary to differentiate the variation of some sort of color nomenclature. This is more or less of an indefinite matter, but this year one of the committees of the A. S. T. M. has attempted to define a series of limits of composition for the various color designations, as follows:

Yellow brass, containing from 63 to 80 per cent copper and having a yellow or brass color. Typical composition zinc 30 per cent, copper 70 per cent.

Red brass, containing more than 80 per cent copper, the color varying from a golden to a copper red. Typical composition zinc 15 per cent, copper 85 per cent.

Yellow red brass, containing from 55 to 63 per cent copper and having a yellowish red color.

In addition to the straight brasses, which as before pointed out are alloys of copper and zinc alone, there are many varieties of special brasses in which a small amount of some other metal or metals is added in order to impart certain special qualities. These have been known by various names, such as manganese bronze, Tobin bronze, leaded brass, etc.

In the term "manganese bronze" we have another misnomer, inasmuch as it is in reality a brass, and furthermore in the finished product there is practically no manganese, a small amount of the latter only having been used as a deoxidizer and disappearing in the process of manufacture. Its composition as given in the A. S. T. M. specification is: Copper, 53 to 62 per cent; zinc, 36 to 54 per cent; aluminum, 0.05 to 0.5 per cent; lead, not over 0.15 per cent.

Its physical properties are considerably above those of ordinary brasses—tensile strength, 70,000 lb. per square inch; elongation in 2 in., 20 per cent.

Likewise "Tobin bronze" is a trade name for a brass which is said to contain about 58 per cent copper, 40 per cent zinc and the balance tin, iron and lead. "Free cutting" brass contains about 3 per cent lead, which is added to improve the machining qualities, particularly for threading. For these and other special alloys the A. S. T. M. committee has recommended: "In cases where other metals are added to the brass in small amounts these brasses be designated by the use of the proper prefix or prefixes, thus:

Lead Brass, such as lead, 1 per cent; zinc, 33 per cent; copper, 66 per cent.

Tin Brass, such as tin, 0.5 per cent; zinc, 39.5 per cent; copper, 60 per cent.

Manganese-tin-brass, such as manganese, 0.50 per cent; tin, 1 per cent; zinc, 38.50 per cent; copper, 60 per cent.

COMPOSITION OF FORGING BRASS

To obtain a brass which can be forged and easily machined, the copper content is kept down around 60 per cent and small amounts of iron and lead are added, the A. S. T. M. specification being: Copper, 58.5 to 61.5 per cent; lead, 1.5 to 2.5 per cent; iron, not over 0.15 per cent; materials other than copper, lead and zinc, not over 0.35 per cent; zinc, remainder.

This material will stand flattening while hot, until reduced to 20 per cent of the original length, without cracking. With regard to this material an explanatory note is added: "The material exhibits a very considerable variation in properties with slight changes in composition. Its strength, stiffness and ability to stand forging operations are in inverse proportion to the copper content; so also is the amount of lead which the alloy can contain without producing hot shortness. Toughness, on the other hand, is directly proportional to the copper content."

As before stated, bronze is an alloy of copper and tin, containing more than 50 per cent of copper. The tin content runs from about 4 per cent to 25 per cent.

In this class are a great variety of alloys, a characteristic one used industrially being "gunmetal," whose composition is: Copper, 86 to 89 per cent; tin, 8 to 11 per cent; zinc, 1 to 3 per cent. Its physical properties are: Tensile strength, 30,000 lb. per square inch; elongation in 2 in., 14 per cent.

A variety largely in use for car hardware is that known as "statuary" bronze, which contains a small amount of lead and on exposure to the air takes an "oxidized" finish.

Bronze is used to a considerable extent for trolley wire chiefly on account of its resistance to wear. Standard specifications do not call for a given chemical composition, but simply require that the bronze shall be of "such nature and composition as to secure, by proper treatment, the qualities desired." Two grades are covered by the specification, one to have a conductivity of 40 per cent and the other 65 per cent, figured according to the International Annealed Copper Standard, which is 0.15328 ohm per meter-gram at 20 deg. C.

The 40 per cent conductivity wire is required to have a tensile strength of about 70,000 lb. per square inch, and the 65 per cent about 60,000 lb. per square inch. This is as compared to the plain copper trolley wire having a tensile strength of about 50,000 to 55,000 lb. per square inch.

KINDS OF BEARING METALS USED

The alloys commonly used for bearings are of four kinds: Copper base with more than 50 per cent copper; tin base with more than 50 per cent tin; lead base with more than 50 per cent lead, and zinc base with more than 50 per cent zinc.

The bearings in general use for car truck journals and motors consist of a so-called "phosphor" bronze lined with "babbitt." The term "phosphor" bronze really does not describe the metal, as only a very small amount of phosphorus is added to the metal, and the purpose of it is simply to act as a cleanser during the process of manufacture, there being practically none left in the alloy when completed.

The American Railroad Association (M. C. B.) has a standard specification for bronze for journal bearings, which permits two alternative compositions, as follows:

	A per Cent	B per Cent
Lead	24.0 to 30.0	8.0 to 16.0
Tin, not less than	4.0	7.0
Copper, not less than	65.0	Not over 82.0
Zinc and other impurities, not more than	3.0	3.0

The A. S. T. M. has prepared a tentative specification for car bearings, serial No. B 17 - 18 T, which provides as follows: Lead, 17.0 to 22.0 per cent; tin, 4.0 to 6.0 per cent; zinc, maximum 2.5 per cent; iron, maximum 0.40 per cent; antimony, 0.50 per cent; copper, remainder. Total impurities, including zinc, maximum 3.0 per cent.

The A. R. A. (M. C. B.) committee on specifications and tests for materials presented at the convention in June of this year a report calling for a revision of the standard A. R. A. (M. C. B.) specification, so that it will be as follows:

	A per Cent	B per Cent
Lead	16 to 24	24 to 30
Tin	5 to 7	4 (minimum)
Total of other impurities, maximum	4	3
Copper	67 to 77	63 to 72

"The owner of the equipment on which the bearings are to be used shall specify which class of metal is desired. If he does not do so, metal of Class A shall be furnished."

It is to be understood that the foregoing is not yet a standard of the A. R. A., but is simply the recommendation of the committee. It is possible also that some action may be taken to bring the specifications of the A. R. A. and the A. S. T. M. into agreement.

The present A. R. A. (M. C. B.) standard specification for lining metal is as follows:

	Up to ⅛ In. Thick	⅛ In. Thick and Over
Lead	94.0 to 96.0 per cent	Not over 88.0 per cent
Antimony and tin	3.0 to 5.0 per cent	Not over 17.0 per cent
Tin	0.50 to 1.5 per cent	....
Other impurities, not over	0.5 per cent	0.75 per cent

The A. S. T. M. tentative specification for lining metal, Serial No. B 17 - 18 T, calls for copper, 0.50 per cent maximum; tin, 4.5 to 5.5 per cent; zinc, none; antimony, 9.25 to 10.75 per cent; arsenic, 0.20 per cent maximum; lead, remainder. Total impurities, maximum 0.75 per cent.

The A. R. A. committee report this year recommends the following for lining metal:

	C per Cent	D per Cent
Tin	3 to 5	0.5 to 1.5
Antimony	8 to 10	....
Antimony plus tin	12 to 14	3 to 5
Arsenic, maximum	0.2	....
Total of other impurities, maximum	0.5	0.5
Lead	85 to 88	94 to 96

"Metal of Class C is for linings of a nominal thickness over ⅛ in., metal of Class D is for linings of ⅛ in. or less in nominal thickness. Either composition of the back may be used with the composition of lining metal specified for the thickness of lining which is ordered."

A. E. R. A. HAS NO STANDARD SPECIFICATIONS

In passing it may be noted that the American Electric Railway Association has never adopted any standard specification for either bronze or lining, although A. R. A. specifications are used by many of the electric railways for journal bearings. Another generally used specification for journal bearings is the following:

Bronze.—Copper, 77 per cent; lead, 15 per cent; tin, 8 per cent; phosphorus, 0.2 per cent.

Lining.—Lead, 85 per cent; antimony, 10 per cent; tin, 5 per cent.

For armature and motor bearings a high class "phosphor" bronze is quite generally used by electric railway companies in this country having the following composition:

Copper, 84.00 per cent; lead, 0.50 per cent; tin, 12.00 per cent; zinc, 3.50 per cent.

Lining metal.—Tin, 83⅓ per cent; antimony 8⅓ per cent; copper, 8⅓ per cent.

Attention is called to the fact that the lining material above quoted has a tin base, which makes it expensive, but this composition is particularly desirable for armature bearings on account of the high speed of the shaft and difficulties of lubrication. This is a true "babbitt" metal, the term applying strictly only to tin base bearing metals having over 50 per cent tin in their composition. The journal linings are therefore not strictly "babbitt," but should rather be termed "lead lining metal."

To sum up, we may make use of the following tabular form for the alloys in common use:

1. *Pure Copper:*
    - Lake
        - Low resistance
        - High resistance
    - Electrolytic
    - Casting
    - (a) Wire:
        - Cable (annealed).
        - Trolley wire (hard drawn).
    - (b) Bars for buses, etc.
    - (c) Castings for terminals, controller fingers, etc.
2. *Brass.*—Compound of copper and zinc (over 50 per cent copper):
    - (a) Yellow brass, typical composition, copper 70 per cent, zinc 30 per cent.
    - (b) Red brass, typical composition, copper 85 per cent, zinc 15 per cent.
    - (c) Yellow red brass, typical composition, copper 60 per cent, zinc 40 per cent.
    - (d) Special brasses, such as "Manganese Bronze," "Tobin Bronze," "Leaded Brass," "Forging Brass," etc.
3. *Bronze.*—Composed of copper and tin (over 50 per cent copper). Typical composition, copper, 90 per cent; tin, 10 per cent.
4. *Bearing Metals:*
    - (a) Copper base (over 50 per cent copper, such as journal brasses), copper, 65 per cent; lead, 30 per cent; tin, 5 per cent.
    - (b) Tin base (over 50 per cent tin, such as lining for armature brasses), tin, 83⅓ per cent; antimony, 8⅓ per cent; copper, 8⅓ per cent.
    - (c) Lead base (over 50 per cent lead, such as lining for journal bearings), lead, 85 per cent; antimony, 10.4 per cent; tin, 5 per cent.
    - (d) Zinc base (over 50 per cent zinc). Not in general use.

It has been impossible in the limits of an article such as this to give other than an outline indicating the general nature and use of these metals and their alloys. And it must be remembered that any specification does no more than the recipe book of the housewife, providing simply the basis on which a good cook can produce a good loaf of bread. And so in the handling of these copper alloys a great degree of experience is necessary in their manufacture, as it has long been recognized that brass founding is one of the most difficult of arts. The figures given herein are therefore merely illustrative and are used simply to give a slight indication of the nature and the use of these materials on electric railways.

Fire and accident hazard have been almost wholly eliminated by the use of gas for removing and setting locomotive tires in the shops of the Colorado & Southern Railroad. Also less space, time and fuel are required by the use of gas burners which fit around the circumference of the tire, which is chained into position and all ready to be set when the expansion is sufficient. Formerly it was necessary to heat the tires over wood or forge fires and then handle them while hot. Later, liquid fuel burners were devised to heat the tires while in place, but the heat control was difficult, and the danger of fire and accident was very serious.

New Type Brake Adjuster

A DEVICE for the convenient adjustment of the brakes on surface cars has been designed by S. Thomas, engineer of the Peckham Truck & Engineering Company of London. It consists of a geared arrangement which can be fitted to any type of truck, and the adjustment of the brake rigging is accomplished by turning a ratchet pawl.

The advantages claimed for this device are:

That it adjusts all brake shoes evenly and simultaneously, so that all the brake shoes have proper clearance from the wheels, thereby insuring perfect braking of the car.

HAND ADJUSTER FOR BRAKE RIGGING

That it is so constructed that it is impossible to adjust one pair of brake shoes without adjusting others.

That it is impossible to adjust the brakes so that the shoes will be too tight against the wheels.

That the adjusting mechanism is entirely encased in a dust tight grease box and is always free from dirt.

That once adjusted it is not necessary to readjust the brake rigging every time that old brake shoes are replaced with new ones, as the nuts on the brake rods are slackened off evenly.

To renew worn out brake shoes, the pawl of the ratchet lever on the adjuster shaft is released and the adjuster shaft is then turned with a spanner wrench. This will slacken the brake shoes from the wheels evenly and the old shoes can then be replaced with new ones. The ratchet pawl can then be allowed to fall into position again.

Charring Does Not Preserve Wood

CHARRING is of little value in protecting the butts of fence posts and telephone poles from decay. This is shown by service tests made by the United States Forest Products Laboratory on fences of charred and untreated posts of various species. The charred posts proved in these tests to be even less durable than the untreated ones.

Theoretically, an area of charred wood around a post should prevent decay, because charcoal does not decay or encourage the growth of fungi. But the charred area around a post is not usually a solid covering. It is checked through in many places. If posts are seasoned before they are charred the charring does not reach to the bottom of the season checks which are always present. If green unchecked posts are charred checks will open through the charred part as the wood seasons. In either case the uncharred center of the post is exposed to fungus infection and will decay as rapidly as any untreated wood. Charring deep enough to resist decay would undoubtedly weaken a post of ordinary size.

Substation Layout of Southern Pacific Company in Oregon

Power for 1917 Extension of Interurban Lines Furnished from Substation with Outdoor High-Tension Construction—Two-Unit Rotary Converter Sets Installed

BY PAUL LEBENBAUM
Electrical Engineer Portland Division Southern Pacific Company

EXTERIOR AND INTERIOR VIEWS OF OSWEGO SUBSTATION

The upper view shows the 1,000-kw. substation at Oswego, with indoor switching equipment. The lower view shows the 500-kw. synchronous motor-generator sets in this substation.

THE Southern Pacific Company is now operating approximately 146 miles of 1,600-volt electric interurban lines in the territory adjacent to Portland, Ore., the exact location of which is shown in the accompanying map. That portion of the lines between Portland and Whiteson, a total of 103 miles, was placed in operation in January, 1914. Articles descriptive of this appeared in the issues of the ELECTRIC RAILWAY JOURNAL for Feb. 14, 1914, page 359; July 10, 1915, page 57, and Sept. 10, 1915, page 562.

In June, 1917, an extension to the foregoing electrification was placed in service, comprising 43 route-miles of track between Whiteson and Corvallis. A brief résumé of the main features of the earlier construction may not be out of place at this time. The contact system and, of course, the rolling-stock are common to both sections. The differences, appearing principally in the substations, are illustrative of the advance in the art of designing railway conversion apparatus during the time intervening between the purchase of the first sets in 1911 and the newer sets in 1916.

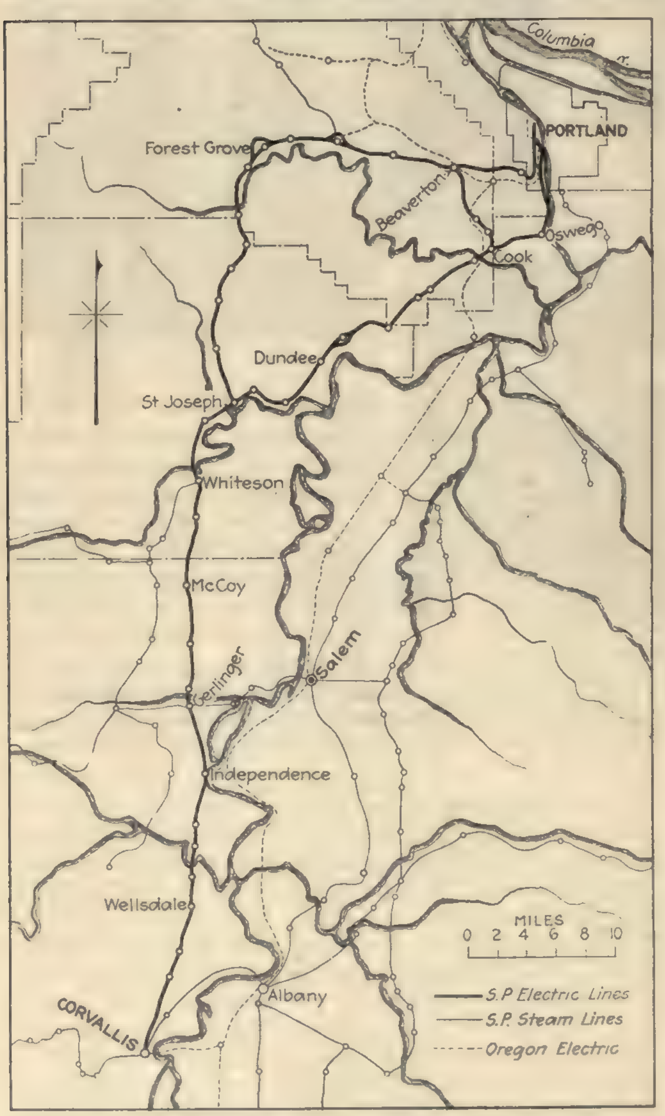
The contact system is of the standard catenary suspension type, with a No. 0000 grooved copper trolley wire supported every 15 ft. from a $\frac{7}{16}$-in. galvanized steel strand messenger cable of 15,000 lb. breaking strength. The standard span is 150 ft., and cedar poles, brush-treated with carbolineum, were used. As a result of favorable experience with the preservative treatment it was decided to give all poles used in the extension from Whiteson to Corvallis an open-tank treatment with creosote. Steam, obtained from an existing boiler plant, was fed through coils laid on the bottom of the treating tanks. The poles were set in the cold oil and the temperature was raised until it registered between 215 deg. and 220 deg. F. The length of time at which the oil was maintained at this temperature varied from fifteen minutes for a run of well-seasoned poles to two hours or more for the greener poles. A satisfactory penetration was obtained, ranging from ½ in. to 1 in.

In the operation of the road, trains are made up with from two to six cars, both motors and trailers, in the ratio of one trailer to every two motor cars. All cars are steel, the motors weighing 51 tons and the trailers 35. The motor equipment consists of four GE-205B 110-hp. motors, with Sprague-General Electric type M multiple-unit control. There are in use thirty-eight motor cars and eleven trail cars, and there have been ordered for delivery in 1921 six additional motor cars and six trail cars. This will bring the total number of cars, including eight cars for mail, baggage and express, up to sixty-one. All freight trains are operated by steam locomotives.

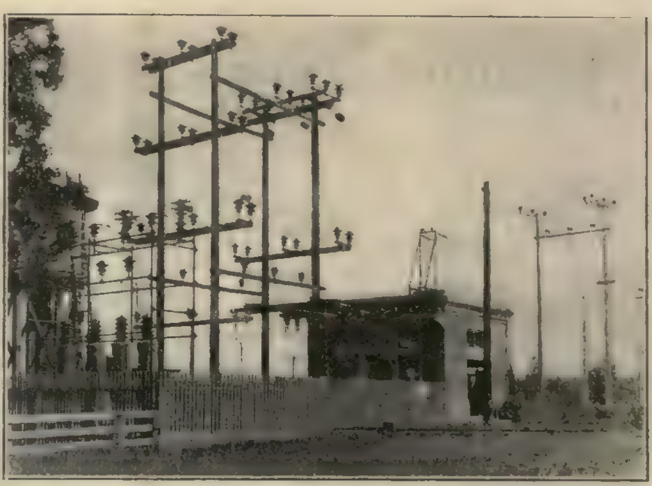
EARLY 1,600-VOLT GENERATORS SUCCESSFUL

For the lines between Portland and Whiteson direct current at 1,600 volts is supplied to the contact system through substations at Oswego, Forest Grove and Dundee. Each of these substations contains two 500-kw. motor-generator sets, each consisting of a 560-kw., 13,000-volt, 60-cycle, three-phase, 720-r.p.m. synchronous motor direct-connected to a 1,600-volt generator. Energy for these substations is taken from the lines of the Portland Railway, Light & Power Company at 55,000 volts. At Oswego this is stepped down to 13,200 volts through two 1,000-kw., three-phase transformers for transmission to Forest Grove and Dundee.

The direct-current generators, ordered in 1911, were about the first machines to be built with 1,600 volts on one commutator. They are equipped with commutating poles, but have no compensating pole-face windings or flash-barriers. Everything considered, they are operating in a satisfactory manner; flashovers occur occasionally, but they are seldom of a serious nature. During the winter, when the heating load is added to the regular traction load, the two sets at Oswego often carry a maximum half-hour average load of 1,200 to 1,400 kw.



MAP OF SOUTHERN PACIFIC COMPANY'S ELECTRIFIED LINES IN OREGON



WELLSDALE STATION, SHOWING OUTDOOR HIGH-TENSION APPARATUS

NEW SUBSTATIONS ARE OF ROTARY CONVERTER TYPE

The substations on the extension between Whiteson and Corvallis are located at McCoy and Wellsdale. They are supplied with energy at 55,000 volts, delivered at Salem by the Portland Railway, Light & Power Company to the transmission line of the railroad. From Salem to Gerlinger this line is on the company's right-of-way; at Gerlinger it branches north to McCoy and south to Wellsdale. Open-air, pole-top sectionalizing switches are located in each branch at Gerlinger.

Sixty-cycle rotary converters are used to deliver current to the contact system. Each station contains a 1,000-kw. set, consisting of two 500-kw. units mounted on a common base with three bearings. The alternating-current ends of these units operate in parallel from the doubly-wound secondaries of the three-phase step-down transformer. The direct-current ends are connected in series to give 1,600 volts. The rotaries run at a speed of 1,200 r.p.m. The over-all dimensions are 4 ft. 5½ in. x 5 ft. 7¾ in., with a height of 4 ft. 10¼ in. The total weight of the set is 22,250 lb.

All high-voltage alternating-current apparatus is situated outside the building. This permits a very compact arrangement of the apparatus inside of the building, with the result that the inside dimensions of the building are only 19 ft. x 22 ft. The transmission line ends at a pole-top, fused switch, operated by a lever from inside the station. Choke coils and a four-tank electrolytic arrester afford protection against lightning and other line disturbances. The step-down transformer is star-connected on the primary side with a doubly-wound secondary of 480 volts. Each secondary winding is tapped at the center to obtain starting voltage for the converters. This makes a total of eighteen secondary leads.

The rotaries are six-phase, diametrically connected through suitably interlocked starting and running oil

INTERIOR OF WELLSDALE SUBSTATION, CONTAINING ONE 1,000-KW. TWO-UNIT ROTARY-CONVERTER SET

switches to the secondary leads. The oil circuit breakers are manually operated and provided with low-voltage release coils. In starting, the "low" machine is first put on the line at starting voltage, direct-current polarity is fixed in the usual manner, and then the machine is thrown on full voltage. The same operations are performed in starting the "high" machine. The negative circuit breaker and switch are closed, then the positive breaker, and finally the closing of the positive switch, which is interlocked with the breaker, places the machine on the line.

The set is guaranteed to carry 300 per cent load momentarily. On a test load of 2,500 kw. the direct-current breakers were opened without any sign of sparking at the commutators. The only protection against flashing is the feeder resistance of 0.12 ohm between the machine and the first tap to the contact wire. Flashing occurs at infrequent intervals and is caused mainly by line or equipment trouble. The machines were originally equipped with soft graphite brushes, which threw a great deal of dust around the station when the commutators flashed over. More recently a harder type of carbon brush was substituted. It gives apparently the same highly polished commutating surface as the graphite brush, but has the advantage of not disintegrating on flashover to the same extent as the other brush. There have been no flashovers between collector rings.

POLE-TREATING PLANT, ST. JOSEPH, ORE.

The transformers are water-cooled. Water is supplied from a well at each station and raised to the water tank by means of a motor-driven triplex pump. From the tank the water flows by gravity through the transformers back to the well.

A motor-driven air-compressor is provided for blowing out the machines.

On the switchboard, besides the usual ammeters and voltmeters, there is a graphic recording wattmeter, measuring the incoming power, and a wattmeter indicating the wattless component of the incoming energy.

The substations, completely equipped and ready for operation, cost approximately $25 per kilowatt.

Creeping of Rails

Dr. J. A. L. Waddell Inaugurates Investigation by Means of Questionnaire — Subject Should Receive Attention of Engineers of Way

IN A PAPER presented before the American Society of Civil Engineers in New York City on Nov. 3, 1920, Dr. J. A. L. Waddell gave the results of a canvass which he had made, on behalf of a client, to determine the facts regarding rail creepage. He used the following questions in his investigation, and they are reprinted here for the convenience of way engineers of electric railways who may desire to contribute the results of their experience.

1. What troubles, in your experience, are engendered by the creeping of rails?
2. Is rail creeping proportional to the amount of traffic passing over a track?
3. With the traffic in one direction only, is the creeping greater on down grade or up grade, and to what extent?
4. On a single-track line, is the creeping greater in the direction of the heavy traffic, and, if so, to what extent?
5. On what portions of your line do you find the greatest creeping of rails—on tangents or on curves?
6. Does the degree of curvature affect the amount of creeping?
7. Does one rail in a track ever creep more than the other? Under what conditions?
8. For the same train loads, is the creeping greater on light rails or on heavy ones, and, if so, to what extent?
9. Does the amount of creeping vary with the nature of the roadbed, and with the kind and depth of the ballast, and, if so, to what extent?
10. Does the amount of creeping vary with the temperature and weather conditions?
11. Does the amount of creeping vary with the character and efficiency of the rail splicing, and, if so, to what extent?
12. Does the amount of creeping depend on the use or the non-use of rail-chairs or of tie-plates, and, if so, to what extent?
13. Have you found any satisfactory method of checking or of lessening creeping, and, if so, what is it?
14. Have you evolved any theory as to the causes of rail creeping, and, if so, what is it?
15. Have you had any computations made as to the resultant force causing creeping under specific conditions?
16. Is there any information on the subject that you can furnish, not covered by the preceding questions, and, if so, what?

The National Research Council has established a Research Information Service as a general clearing house and information bureau for scientific and industrial research. This "Service" on request supplies information concerning research problems, progress, laboratories, equipment, methods, publications, personnel, funds, etc. Ordinarily inquiries are answered without charge. When this is impossible because of unusual difficulty in securing information the inquirer is notified and supplied with an estimate of cost. Requests for information should be addressed, Research Information Service, National Research Council, 1701 Massachusetts Avenue, Washington, D. C.

Lubrication of Electric Railway Equipment

Facts and Figures to Demonstrate the Relation of Correct Lubrication to the Problem of Keeping Operating Expense Down to a Minimum

THE September issue of *Lubrication* contains an article on the relation of lubrication to operating expense. Some parts of this are given in the following paragraphs:

Two very important factors of operating expense are affected by lubrication, the initial cost of lubricants and the cost of car maintenance. The relation of these two factors to the total operating expense is shown by the consolidated figures of five typical electric railways operating in one of the Eastern states. The following figures were taken from their annual reports for 1918 to the State Public Utilities Commissioners:

	Total	Per 1,000 Car-Miles	Per Cent of Total
Total operating expense..........	$12,659,000	$237.40	.....
Maintenance of equipment........	1,357,000	25.71	10.82
(*a*) Cars........................	599,000	11.28	4.72
(*b*) Electrical..................	419,000	7.89	3.31
Cost of lubricants................	13,296	.25	.10
Total car-miles..................	53,184,000	......	.....

From these figures it is very clear that the actual cost of lubricants is the insignificant amount of one-tenth of 1 per cent of the total operating cost and only 2.21 per cent of the cost of maintaining the cars. These costs prevailed in 1918, and although the cost for 1920 will be much higher the ratio between the various items will not be far different.

An essential requirement in reducing maintenance cost as affected by lubrication is the regular inspection of cars. The inspection periods will vary with different properties operating under different conditions and with varied equipment and should be worked out in accordance with conditions. These inspections are usually divided into three classes, daily, light and heavy.

The daily inspections cover all the safety devices and the repair of broken parts reported by the crew. In addition, some types of motors require daily oiling and in some instances other parts of the equipment as well. Such daily oiling periods should be eliminated whenever possible through co-operation with equipment manufacturers in the way of design in which efficient lubrication should be given proper consideration.

The light inspections, at intervals of eight to ten days, include a thorough inspection of all mechanical and electrical equipment that may become worn or damaged under normal operating conditions. Modern types of motors having oil and waste lubrication are oiled at this time and the amount applied should be given careful consideration, as the excessive application of oils does not improve lubrication and can have but one effect, which is absolute waste.

The heavy inspections covering complete overhaulings are determined by the normal life of the equipment and must be regulated in accordance with the various elements surrounding the particular operation, the mileage made by the equipment and many other factors which demand close attention and good judgment by those responsible for the general upkeep of the equipment.

At the time of any of these inspections if it is shown that any of the bearings are worn beyond the safe limit allowed they should be removed promptly, as many damaged armatures have been caused by careless inspections and the attempted use of bearings which should have been removed. The best of lubricants and the most efficient method of applying them will not lubricate a bearing that has become worn to a point where it is no longer in proper alignment. In the replacement of bearings care should be exercised to see that the new bearings have been properly babbitted, finished and lined up.

The efficiency of lubrication depends to a considerable degree upon the suitability of the bearing metal used in connection with the work imposed upon both the bearing and the lubricant. Certain kinds of babbitt may give excellent results under a given set of operating conditions, while under other conditions they may be wholly unsatisfactory. As he is not in the bearing-metal business, it does not behoove the oil man to attempt to say what kind of metal should be used, although the lubricating engineer should make a study of and be qualified to advise with master mechanics as to the proper metal, the method of heating and pouring babbitt, the heating of bearing shells and all other details connected with this important factor. After suitable bearings have been provided care should be given to the correct method of cutting oil grooves, as well as to see that all bearings are properly lined up.

SOME ESSENTIALS IN PACKING OF BOXES

Journal boxes should be carefully cleaned of all old waste and other foreign matter before packing with clean waste. The method of packing depends a great deal upon the design of the waste cellar and the position in which the waste must rest against the journal. Journal boxes should be packed by placing a roll of saturated waste in the mouth of the box and then shoving it evenly under the journal to the extreme back of the box. This first roll should be packed in very tightly against the sand collar to assist in keeping out sand and other foreign matter. Other rolls are packed in similarly until the box is full to the end of the shaft. The waste should not extend in front of the journal nor above the center line of the journal on each side.

In the packing of armature and axle boxes where waste rests on top of the shaft the waste around the sides of the box should be packed down very tightly to hold the waste in the box securely for the purpose of keeping the oil from flowing down the sides of the box when added to the waste, and all loose ends of the waste should be gathered up and packed in tightly to prevent any leaking of the oil from the box.

Axle and armature bearings of the side window type should be packed in such a way that the waste keeps its position against the shaft, to permit of the capillary action of the oil. On certain types of such bearings it is necessary to use a wedge to hold the waste in place.

The waste used in packing all bearings should be of a high-grade quality and resilient, so that it will not pack down in a soggy mass at the bottom of the box when oil is added. It too often occurs that the initial price of the waste is the first consideration without any thought being given to its life, the frequency of renewal and the ability of the waste to carry the oil to the bearings in the proper quantity.

SATURATION OF WASTE IMPORTANT

The initial saturation of waste should be given careful consideration and can be best accomplished in a tank containing a sufficient amount of oil completely to submerge the waste which has been thoroughly pulled apart. The oil should be kept at a temperature of not less than 70 deg. F. and the waste allowed to stand for forty-eight hours, after which it should be placed upon a coarse-mesh screen and allowed to drain for twenty-four hours before being put in use.

In addition to efficient waste saturating tanks the well-equipped oil house should have steel tanks with measuring devices for holding car oils, compressor oil and signal oil, as well as a waste-washing machine. While it may seem expensive to install this equipment it pays for itself in a short time through the improved condition of lubrication, the elimination of foreign matter in the waste as applied to the bearings and the elimination of considerable waste of oils, the latter occurring to a large degree through leaky barrels and the accessibility to the supply by those who are not interested in economies. When wood barrels are emptied into steel containers they can be returned promptly to the oil seller, who will pay the market price for them, thus offering another opportunity to make a saving in the initial cost of lubricants.

HUMAN ELEMENT SHOULD BE CONSIDERED

After officials of street railway companies have done all that can be accomplished in the way of providing suitable equipment and methods for handling lubricants there is still the human element to be considered, viz., the type of man who actually handles the lubricants and applies them to the equipment. In power houses considerable money is spent in providing automatic lubricating devices and elaborate means are furnished to insure efficient lubrication. Conditions in power houses are not nearly so severe as those imposed upon rolling stock, and the latter naturally requires closer attention to bring about the desired results, consequently it is not economical to use the cheapest possible men for this work, as so much depends upon the thoroughness with which the work is carried out. To so great an extent can car maintenance cost be reduced by proper attention to lubrication that intelligent, trained men should always be employed for this work. Trained men are necessary to care for the mechanical equipment and to keep it in good condition. Why should not the man who is responsible for the application of the lubricants, the principal factor affecting the condition of the equipment, be as thoroughly trained in his part of the work?

With the equipment in good condition and with trained men to apply the lubricants we must now decide what lubricants should be used. The rolling stock of all electric railways is subjected to very severe service, entailed by rough tracks, dusty and sandy roadbeds, mud and water, snow and ice. The vibration of the car and the other elements mentioned all tend to make efficient lubrication somewhat difficult. The varying conditions of operation and equipment require different kinds of lubricants, but in every instance the higher quality lubricants will last longest and give the most efficient results.

Too little attention has been given to the reclamation of oils. All oils retain their lubricating value until they have decomposed, and as the decomposition of straight mineral oils, which can be and should be used quite exclusively for electric railway lubrication, is of such an indeterminable period proper filtering facilities should be installed for the purpose of reclaiming oils from discarded waste, from compressors and all other places where it is possible to gather dirty oil, which, at the present time, is quite generally thrown away. This oil, if properly filtered, will afford just as efficient lubrication as it did in its initial state. Users of mechanism in all other classes of business are giving close attention to the reclamation of dirty oils, by which enormous savings are shown. This factor should be given the careful attention it deserves by electric railway companies.

GEAR AND PINION LUBRICATION

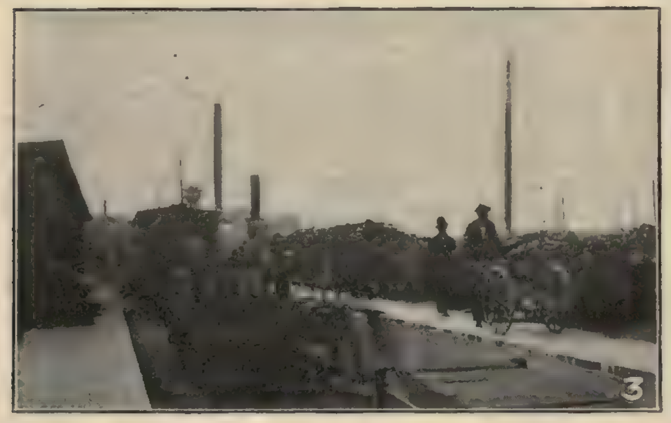
One of the most important problems and one which has received the least actual practical consideration in the way of developing a suitable lubricant is that of the gear and pinion lubrication. Gears and pinions when properly installed should be provided with an oil-tight gear case which will provide means for the bath system of lubrication, if so desired, as well as preventing grit, dirt, water and other foreign matter from coming in contact with the gear and pinion teeth. A suitable lubricant should be semi-fluid, heavy enough in body to reduce wear to a minimum, sufficiently adhesive to be carried up to the gear teeth by the pinion and to remain on the teeth at the highest speed of operation. It should not be so thin in hot weather that it will leak out of any possible crevices in the gear case onto the streets, nor so heavy in low temperature that it consumes an excessive amount of power. To meet these extremes of temperature summer and winter grades are necessary.

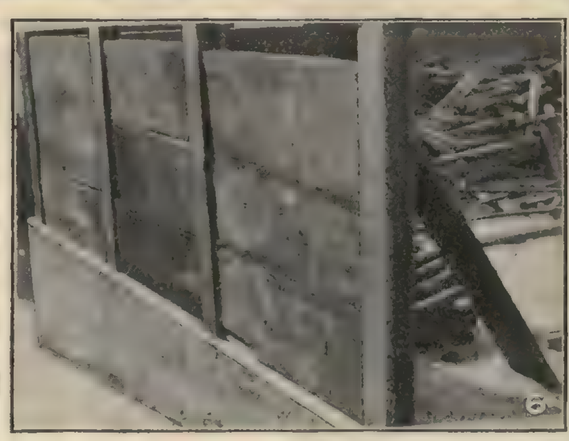
When gear cases are properly installed enough gear lubricant should be placed in the gear case to cover the lowest teeth on the pinion and any larger quantity is unnecessary. When gear cases are worn or loose fitting the lubricant must be heavier and no bath carried. The lubricant should be applied to the teeth direct at the point of mesh between pinion and gear, and by moving the car a short distance the lubricant will be spread over all the teeth uniformly. If it has the necessary adhesive qualities it will lubricate for a long time. The difficulty of securing gear cases that will stay tight is a serious one and the manufacturers of such equipment have a great field for investigation and improvement.

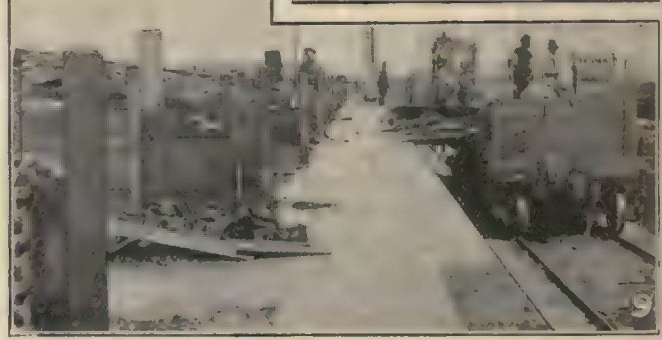
AIR COMPRESSOR LUBRICATION

The air compressors should be lubricated with an oil of proper viscosity to maintain a film on all the bearing and cylinder surfaces and to assist the piston rings in forming a seal to prevent the leakage of air. Compressors lubricated by the splash feed system run in a bath of oil, so that any excessive oil getting past the piston rings should vaporize quickly and be carried out of the cylinder with the air. If it remains in the cylinder too long the heat will carbonize it and the valves will clog. This excess oil vapor is carried into the main reservoir, where it condenses and may be drained out with the water.

Scrap Material Is Salvaged and Efficiently Handled by Means of These Bins by the Pacific Electric Railway







1. End view of scrap docks and ramp approach to dock platform.
2. Bin arrangement and signs designating class of scrap stored.
3. Switching track between platforms with shop forces handling scrap from cars to bins.
4. Runway in front of bins.
5. Scrap bin for brakeshoes.
6. Scrap bins for iron pipe.
7. Incinerator for burning rubbish and insulation from wire and cable.
8. Rear of scrap docks.
9. Arrangement of scrap bins and runway for handling material.

Salvaging Scrap Material

Scrap Docks and Storage Bins Constructed by Pacific Electric Railway for Efficient Handling and Salvaging of Scrap Material

BY CLIFFORD A. ELLIOTT
Cost Engineer Pacific Electric Railway, Los Angeles, Cal.

THE Pacific Electric Railway has constructed at its new Torrence Shops two docking platforms with eighteen scrap bins to facilitate the handling of salvagable material. Each docking platform is 165 ft. long and 30 ft. wide and has a height from the top of the rail to the platform level of 4 ft. There is a switching track between the two docks so that cars can be loaded and unloaded as desired.

The platforms are of solid concrete construction and have concrete ramps at the ends for handling scrap material to and from the docks with trucks or wheelbarrows.

A somewhat novel method was followed in constructing the several scrap bins on the two platforms, 60 lb. scrap T-rail being utilized. This was placed vertically in the concrete for a depth of 3 ft. and extended 4 ft. above the surface of the platform. The use of this T-rail provided a convenient arrangement for holding the wooden planking that serves as the sides of the bins and for the various partitions. Three-inch planks, each 3 ft. in length by 1 ft. in width, were inserted between the ball and base of the rail. The height of the rails above the platform permits the inserting of four planks, but at present only three are used. This arrangement permits increasing the storage space in any bin by removing sections as desired and also provides an easy method of access to the bins. The bins are of nearly uniform size, approximately 25 ft. in depth. Six of them are 10 ft. wide, three 11 ft. wide, one 12 ft. wide and eight 15 ft. wide. There is a 5-ft. runway in front of the bins for the full length of both platforms.

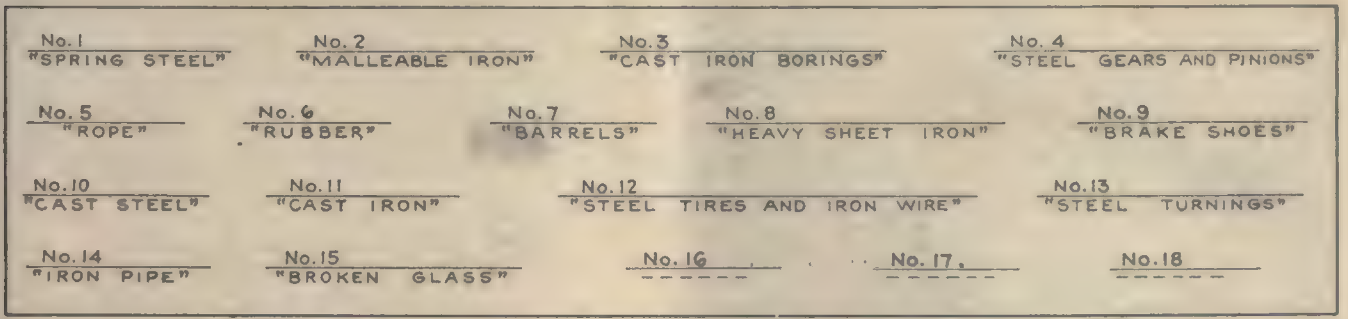
EACH CLASS OF SCRAP CONFINED TO A PARTICULAR BIN

The outside scrap bins are so arranged as to confine each class of scrap to its particular bin. Each bin is numbered and the class and description of the scrap to be stored are designated on a wooden sign with black background and prominent white letters. This sign is displayed at the bin entrance. An accompanying diagram shows the numbering of the various bins and the material that is stored.

By the location of the docking platforms on a level with the car floors and by use of the concrete runways the sorting of various materials is easily taken care of. All scrap from outside points is transported directly from the carhouse or shop to the scrap docks on cars. These are brought in often enough to keep all outside points well cleaned. The sorting of the various materials is done after arrival at the scrap dock. All heavy scrap material is sorted at the outside bin and is then distributed to other bins. The sorting of finer metals and wire which requires additional work in salvaging is confined to an inside salvage warehouse or workshop. This latter class of salvage work requires more skill and attention.

The unloading of heavy scrap is handled by the store department's electrically operated crane, which is mounted on a flat car. This crane is now being equipped with magnets to simplify and reduce the cost of handling cumbersome and extra heavy classes of scrap.

A frame structure 105 ft. long by 25 ft. wide, located at the end of one of the platforms, is utilized as a workshop for the salvage or reclamation foreman and his assistants. There is a separate room in this building for the storage of scrap copper and other valuable metals. At the rear end of the scrap shop an incinerator has been built. This serves for burning rubbish and for removing the insulation from scrap wire and cable. The reclaiming of solder from wire joints, etc., has saved in one month nearly 750 lb. of this material.



ARRANGEMENT, NUMBERING AND CLASSIFICATION OF MATERIAL STORED IN BINS

The scrap docks as now operated handle from 80 to 100 tons of scrap each month and during some months as high as 300 tons of material has been salvaged. This scrap comes from all sources, such as division carhouses, way and structures and line departments, and the several maintenance shops of the system.

A carload of shop rubbish is handled daily, which consists of sweepings and clean-ups from around the shop buildings. This rubbish is put through the incinerator and finally, if there are any metal parts to be reclaimed, these are handled by the salvaging department. The scrap docks are under the jurisdiction of the general storekeeper at the new Torrance Shops, who has the full co-operation of the shop forces in carrying on the work.

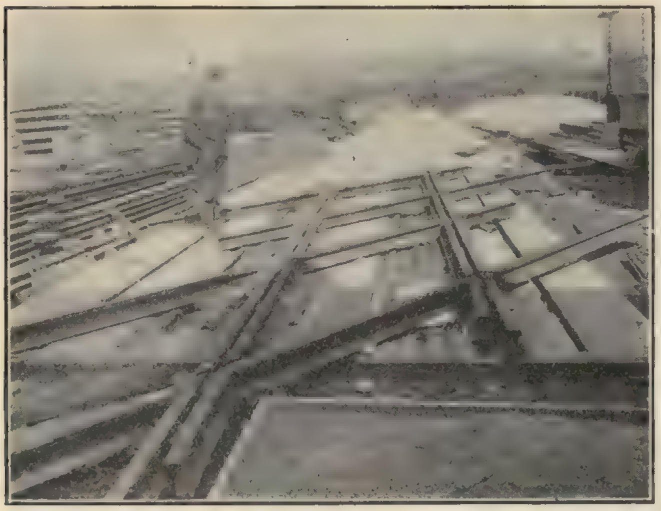
Under test conditions unusual performance was obtained from an installation of 665-hp. B. & W. boilers converted to oil burners by the Savannah Electric Company. Efficiencies ranged from about 82.5 per cent at 100 per cent rating to about 80 per cent at 300 per cent rating. A rather unusual circumstance discovered was that the superheat obtained was only half that obtained when the boilers were coal fired, due no doubt to the more complete burning of the oil in the combustion space, giving higher initial temperatures with better heat transmission in the first pass.

Shop, Track, Power and Line

These Articles and Ideas Are from Men on the Job Who Find Special Applications and New Methods an Incentive for Greater Effort — If You Have Something Good Pass It Along

Welded Crossings for Steam and Electric Intersections

IN ADDITION to the thermit shop-welded frogs and crossings installed in the paved streets of St. Joseph, Mo., described in the ELECTRIC RAILWAY JOURNAL for June 5, 1920, page 1135, the St. Joseph Railway, Light, Heat & Power Company has recently placed in service some of these welded crossings at certain intersections of the electric railway tracks with steam railroad lines.



ACUTE ANGLE CROSSING FOR DOUBLE-TRACK ELECTRIC RAILWAY AND SINGLE-TRACK STEAM RAILROAD INTERSECTION

An accompanying illustration shows an acute angle thermit-welded crossing for double-track electric railway and single-track steam railroad intersection. This crossing was built up in the shops of the electric railway company and installed as a complete section.

Carbon Dioxide and Monoxide in Flue Gas

CHIMNEY losses are indicated by three factors, the percentages of CO_2 and CO and the temperature of the flue gas. F. F. Uehling, in his paper read before the fuel section of the Sixth National Exposition of Chemical Industries, points out that the CO_2 determination is by far the most important as the CO_2 can easily be regulated by the fireman. Given a tight boiler setting, the operator can, by regulating the amount of air admitted and the thickness of the fuel bed, reduce the amount of excess air to about 50 per cent while striving for a maximum CO_2 indication. The determination of the percentage of CO, while necessary where there is suspicion of incomplete combustion, is not essential when CO_2 recorders are in use, Mr. Uehling said, since extraordinarily good economy results from their installation alone.

As an example of the result obtainable with recorders an instance is cited of the placing of a CO_2 recorder in a small New England plant in the engineer's office. None was installed in the boiler room. The firemen were advised to exert every effort to keep up steam with the least coal possible and a twenty-four-hour evaporation test was conducted. This showed a low percentage of CO_2. An additional recorder was then placed in view of the firemen, who were instructed to keep the steam at the customary pressure and to make the CO_2 reading as high as possible. On a second run, made under those conditions, the chart showed a consistently high average of CO_2 and under actual test the fuel saving was 9.9 per cent.

Side Window Curtains for Safety Cars

The Considerations that Led to the Use of Curtains in Cars Are Enumerated and Their Advantages Discussed

IN AN article in the ELECTRIC RAILWAY JOURNAL for May 15, 1920, page 984, one safety car manufacturer advocated the construction of safety cars without side window curtains. A representative of a curtain manufacturer presents the following in favor of the continued use of curtains:

Most passengers of traction cars consider side window curtains in the light of a necessity and also a convenience. The advocates of "curtainless" cars are, we believe, jeopardizing rather than promoting the interests of the traction companies. Their contention, which is based upon the viewpoint of economy of construction and maintenance, is, it would seem, the result of first thought and not a development of serious consideration.

In order properly to cover the subject let us consider the functions of side window curtains for safety cars from the viewpoint of the passenger, as well as from the viewpoint of the operator of the electrical equipment. The primary objects of side window curtains are as follows: (1) To afford shade to passengers. (2) To protect passengers from summer storms. (3) To furnish and trim the car. (4) To protect and preserve the interior of the car.

1. It is very seldom that the tracks of an electric railway on any route continue in the same direction. This necessitates the car's continually changing direc-

tion, thereby altering the angles at which the rays of the sun enter the car. The majority of electric railway passengers are carried in the earlier hours of the morning and in the late afternoon when the rays of the sun are at an acute angle. Without curtains, therefore, there is no means of preventing these rays from entering the car and affecting the comfort of the passengers.

2. When electric cars were originally built, they were divided into two classes—namely, closed cars for winter and open bench cars for summer use. This practice has gradually been discarded and the modern practice of electric railways is to build a car which will be suitable for all seasons. Especially in the summer months, therefore, when sudden storms occur at reasonably frequent intervals, we believe there can be no means provided to protect the passengers and at the same time afford adequate ventilation without the use of side window curtains. As a matter of fact, it is interesting to note that in the case of the open bench car, which has now been virtually discarded, it was found necessary to equip all such cars with curtains capable of being extended to the floor of the car, this being done simply for the purpose of protecting passengers from storms.

3. A very important purpose of the car window curtain is found in the completion of the car trimming. Any one would deem it illogical to consider a dwelling or other structure complete without the addition of such window hangings as would be comparable with the type of construction, and this is likewise true of any type of conveyance, not excepting the safety car.

4. Much harm can be done by the elements to car interiors through lack of curtains, particularly during the summer season. As a matter of fact, without curtains, under such conditions, the entire interior of the car is exposed to the elements and the natural consequences of same.

It is rather interesting at the present time to consider the expense that is actually necessary in order properly to equip the average safety car with side window curtains. It can be conservatively said that the cost of this equipment would not exceed $90 per car. The elimination of an item of $90 would hardly seem worth consideration from any viewpoint of additional saving in the car construction. Moreover, we believe it is a fact that the purchase, on the part of railway companies, of curtain material, fixtures and parts for the maintenance of such equipment is one of the lowest items on the books of these companies. From the standpoint of a manufacturer of side window curtains the evidences on our books would indicate this contention as absolutely correct.

In conclusion, it would seem as though a very substantial question which must of necessity be brought up is: "Do the owners of safety cars intend to place their equipment and their capabilities upon a par with the ordinary jitney or automobile bus, or do they intend to provide the public with a commensurate return for the increased fares over the jitneys that they advertise as being necessary?"

If the first is the case, safety cars should not be built with curtains, but, on the other hand, if electric car riders are to be provided with the best possible service and safest mode of transportation, the only way to back up the advertising of such service is to furnish most modern and attractively equipped cars.

Automatic Substation Building Constructed of Old Paving Blocks

THE accompanying picture is of particular interest because it portrays with what pleasing results old granite paving blocks may be used in building construction. The building here shown is a new automatic substation built by the Omaha & Council Bluffs Street Railway, in Council Bluffs, Iowa, last spring. It is located in a residential section and conspicuously situated on a triangular corner lot. It is distinctly a beautifying addition to the surroundings. It is built from ground line to roof entirely from worn-out granite paving blocks, so that the material involved in the construction of the new substation may be said to have cost the company only the reclamation expense.

AUTOMATIC SUBSTATION IN COUNCIL BLUFFS, IOWA, BUILT OF OLD GRANITE PAVING BLOCKS

The station is equipped with one rotary converter and the automatic equipment for its control. The machine entrance to the building is closed with a rolling steel door, which may be seen in the picture. Ventilation for the machine is secured through three openings at the floor level on either side wall and a single opening on each of the four walls at the roof line.

Instrument to Check Truck Drivers

THE Ohmer Fare Register Company has recently perfected a device for truck owners in the form of the Ohmer Truck Auditor. This instrument produces printed reports of the day's work and acts as a mechanical cost accountant, recording the expenditures for truck operation in the terms of material, time and distance traveled. This device weighs 7 lb., is placed on the dash of the truck and provides a complete printed report of the day's work. The report gives such information as the machine number, driver's number, date and exact time, mileage and miscellaneous data about loading, changing of tires, taking gasoline and oil, etc.

TRUCK AUDITOR SHOWING RECORD

Each driver is provided with an identification key bearing his number. This key must be inserted in the truck auditor before it is possible for him to take his opening statement or to start the engine. He then turns the knurled knob at the right, which prints the opening statement, locks the key in the machine and allows the motor to be started. If the driver wishes to remove the key a closing statement must be printed, and a comparison of the two statements reveals the time and reason for leaving the truck. When the truck is stopped for any reason and the fact recorded, automatically the engine is cut off and another print must be taken to start it. The record thus made shows the time that the truck was stopped and the automatic stopping of the engine effects a great saving.

New Type Car Tried at Seattle

THE Seattle Municipal Street Railway, Seattle, Wash., has recently placed in service a car remodeled under the direction of A. Flanigan, assistant superintendent of equipment, which combines several features of modern cars. This car can be used for either one or two-man operation as it has entrances at both front and side. It is the intention to use two men during peak hours and one when the loads are comparatively light. Both entrances are constructed with double doors to facilitate quick loading and unloading. The car is approximately 50 ft. in length and has seats for fifty-nine passengers, with additional standing room for sixty passengers. Hand straps are not provided, but instead hand rails have been installed. The general design of the car, as well as the step construction, is shown in an accompanying illustration. The car is equipped with the latest safety devices and also is provided with multiple-unit control, which will enable this type of car to be used in train operation if it is found desirable.

SEATTLE'S ONE-MAN-TWO-MAN CAR

Permanent Home for National Research Council

A NEW building in Washington, D. C., will soon house the National Research Council and the National Academy of Sciences. It is to be erected on a block bounded by B and C Streets and Twenty-first and Twenty-second Streets, N. W., facing the Lincoln Memorial in Potomac Park. The site cost about $200,000, which sum was contributed by a number of friends of science, including such men as Charles F. Brush and Ambrose Swasey of Cleveland, Henry Ford, P. S. du Pont and George Eastman. Funds for the erection of the building have been provided by the Carnegie Corporation of New York.

SNOW PLOW OF MONTREAL & SOUTHERN COUNTIES RAILWAY

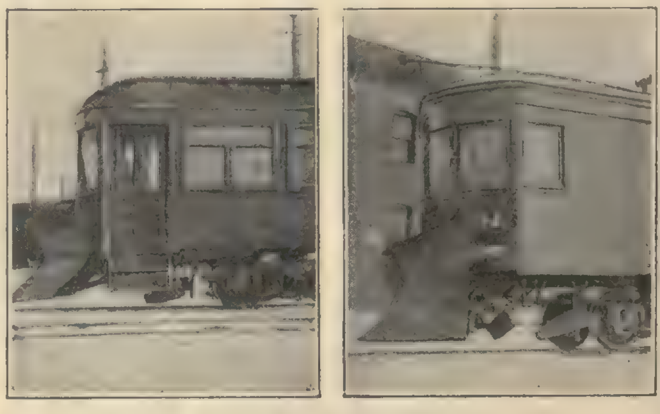
Snow Fighting on an Interurban

How the Montreal & Southern Counties Railway Equips Cars with Plows and Keeps Traffic Going All Winter

WHEN snowfalls are heavy and continuous each year, so that they form a part of the regular program of winter operation, there is no real difficulty in keeping the track clear. This, at least, is the experience of the Montreal & Southern Counties Railway, an interurban line supplying transportation between a group of prosperous communities southeast of Montreal and the city itself.

The line, which has about 66½ miles of track, all electrically equipped, is a part of the Grand Trunk System and crosses the St. Lawrence River on special electric tracks over the Grand Trunk Railway Bridge. Both single cars and trains are run, and for a considerable part of the system a 20-minute service each way is given during the greater part of the day. There has been a continuous increase in traffic since the electrical equipment was installed, and the increase this year is expected to be about 15 per cent.

The principal dependence for snow fighting is a form of steel nose plow, of which illustrations are shown. This plow is built in three sizes. The largest, of which there is one, is used on a 30-ton locomotive, employed as a snowplow in winter and as a locomotive in summer. The plow is somewhat shorter than would otherwise be used because of several sharp curves on the line. As shown, this largest plow is capable of being raised with compressed air, so that when the locomotive enters the paved streets of Montreal it can be lifted. This plow is also equipped with flanges for clearing the right of way.


TYPES OF SNOW PLOWS USED ON CARS

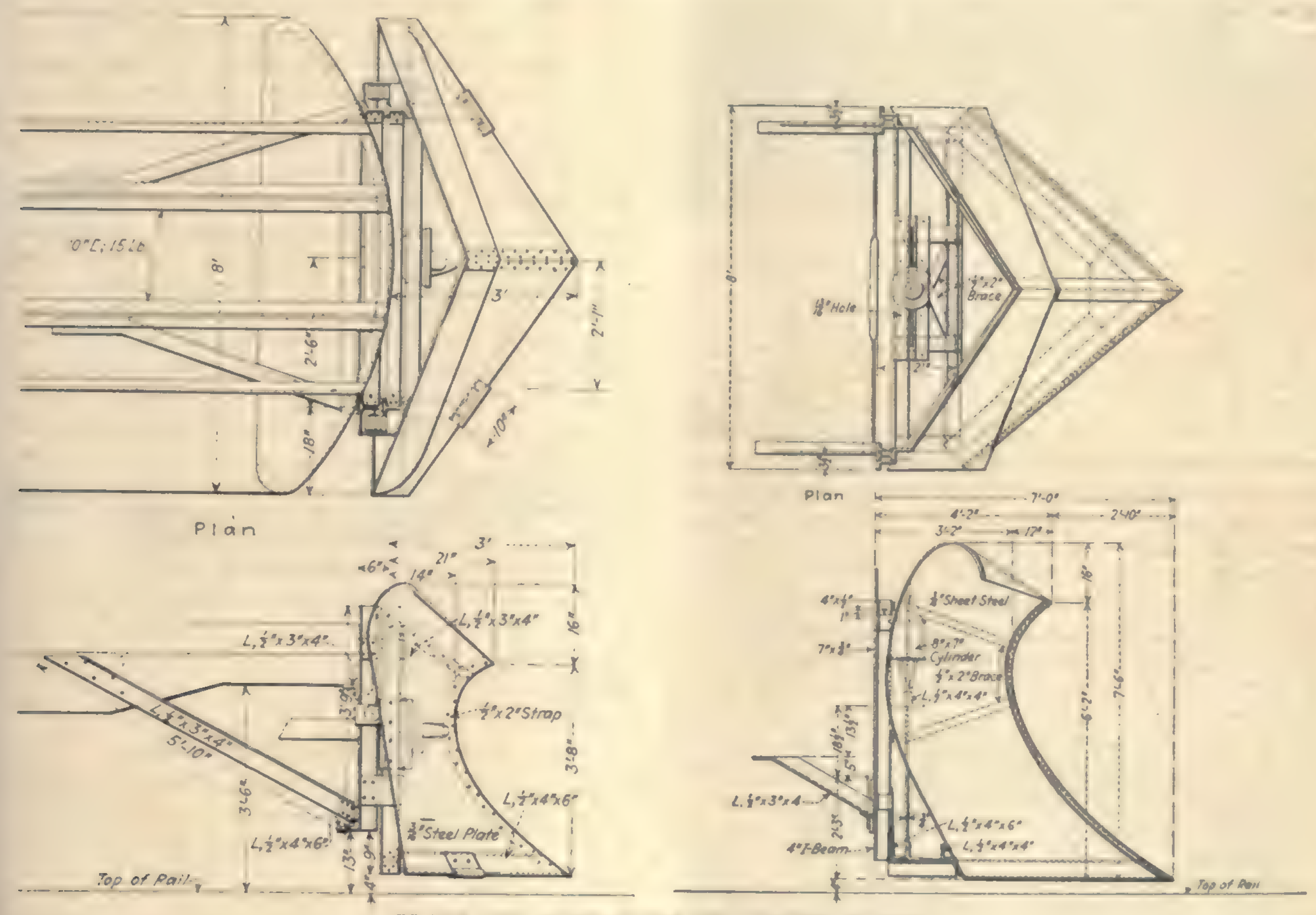
The second or medium size plow is also illustrated. It is similar in general construction to that used on the locomotive, but smaller and lighter, weighing only about 1,000 lb., and being raised and lowered by hand. This plow is used on interurban cars. A smaller plow, weighing about 600 lb., is used on local cars. Both interurban and local cars are also fitted with scrapers.

It has been found that if about 40 per cent of the cars are equipped with these plows practical immunity from snow trouble is secured. The plows are installed on the cars about November and carried until the end of March.

In addition to the use of these plows the company has two sweepers and a large nose snow plow fitted with flangers. Originally a rotary was used, but the present equipment has been found more efficient and the rotary has been dismantled.

Blasting Pole Holes in Frozen Ground

DURING the past five or six years a good deal of dynamite has been used for blasting post and pole holes in frozen ground. Many contractors, construction foremen and others who have tried it condemn the practice because, they say, it makes too large a hole; that is, too wide at the top, and that there is a tendency to loosen the soil too much around the sides of the hole. E. I. du Pont de Nemours & Company, Inc., state that to blast a relatively straight up and down, narrow hole and avoid widespread loosening of the sides the charges should not be tamped in the bore holes.



PLANS AND ELEVATIONS OF LARGER PLOWS

Importance of Testing Welds

Weld Tests Not Yet Standardized—Microscopic Examination of Structure and Bending Test Gives Most Accurate Indications of Quality

AT THE September meeting of the Chicago Section of the American Welding Society S. W. Miller, proprietor of the Rochester (N. Y.) Welding Works, read a paper, of which the following is an abstract, on the development and value of different methods in use for testing welds.

As in all other developments, welding first received its principal impetus from the practical man. Of late, however, the tendency has been to investigate more carefully and more fully and by means not available to the ordinary welder. This means that scientists of all kinds have been called into consultation and that almost every conceivable method of test has been suggested to determine what methods and materials would make the best welds from a standpoint of security as well as service and cost.

Although the testing of metals, aside from welds, using the customary tensile, compression, shock, alternating-stress tests, etc., is quite well developed in practice, the microscope has been found to be of tremendous help in the study of metals as well as welds. While no one method of test shows everything desired to be known, the microscope is probably the most powerful single method of investigation in the case of metals, and in the study of welds it is particularly valuable because of the methods of their formation. A weld is a casting and is subject to all the defects found in castings, which are, however, exaggerated in the case of welds.

The welding of steel is frequently considered as not being especially difficult and it is also sometimes considered that steel is steel and that no different treatment is required in the case of different qualities and varieties of steel. It is not as well known as it should be that a comparatively small variation in the percentage of carbon in the material being welded makes a very great difference in the results of either a bend or tensile test. It has been found by experience that the higher the carbon the more difficult it is to get a satisfactory weld and the more danger there is of injuring the metal being welded. It is also evident that a weld made with a given welding rod or electrode can have only a given strength. If this strength is greater than that of the material being welded, the test pieces will always break outside of the weld, and if weaker of course the weld itself will rupture. It is necessary to know accurately the character of the material being welded to be able to use the right steel alloy for welding. Also the method of test in any given case depends on the use to which the welded piece is to be put.

There are no standards at present for weld tests, but it is advisable, whenever possible, to follow those of the A. S. T. M. Inasmuch as a welded piece is not of uniform character, it is not possible to use the elongation and reduction of area as commonly measured. Where the break occurs in the weld, the elongation of the whole test piece tells very little about the quality of the weld, and it is useful to take the elongation of each inch, two inches, etc., of the gage length, beginning at the center inch which includes the weld, and plotting these figures against the gage length.

The best test, in the opinion of Mr. Miller, to determine quickly the general character of a weld is to grind it off level with the surface of the pieces and clamp it on an anvil, with the center of the weld level with the top of the anvil and the bottom of the V toward the anvil so that the top of the weld is stretched when the projecting end is struck with a sledge. The blow should not be too heavy and the number of blows and the angle to which the piece bends before cracking are quite an index of the value of the weld. It is true in this test, as in the tensile test, that the quality of the material itself has a great influence on results. If a welded piece were to be used in a place where it might become red hot, such as, for instance, in a locomotive fire-box crown sheet, it would be entirely proper to test the weld at a good red heat.

In many cases the defects in welds are easily visible to the naked eye under test. In other cases they are not, and while it would seem plausible that the visible ones were more dangerous, the hidden danger due to the ones that are hard to see is a matter that must not be overlooked. For many years the dangerous defects in steel rails have been those which were not visible and which have usually been very small at the start. There has recently been developed a method for testing rails for these hidden defects which has been devised by A. M. Waring. It consists of etching deeply a polished surface of the material. For instance, a section of a weld might be cut out with a hacksaw, machined or filed to a true surface and polished on various grades of emery paper, ending with No. 00 Manning. It is then placed in a warm solution of 25 per cent hydrochloric acid for from half an hour to an hour. The acid will eat away the defects, making the edges of the material at them taper, so that rather large grooves and pits would be visible, where the defects prior to the etching would be only microscopic. The bending test, hot and cold, and the etching test are of the greatest value in ordinary shop practice where it is desired to find out rapidly and quite accurately what the quality of the work is done by different welders.

Some of the defects in welds are visible under the microscope, but others are invisible until the weld is strained. A small bending machine that can be placed on the microscope stage is very useful, because after etching the piece can be bent and examined and the effect of the strain can be seen. In the case of bare-wire electric welds, the rupture, according to Mr. Miller's experience, always occurs at the grain boundaries even where no defects are visible there at the highest powers of the microscope. Of course, where there are defects visible, the rupture takes place first at these. Where there are no defects, the distortion occurs by slipping in the grains as in normal steel.

An electric weld that will bend very little may be made much more ductile by heating in a reducing atmosphere at a low red heat for one or two hours, indicating that the weakness at the grain boundaries has been removed. Again, heating an electric weld in an oxidizing atmosphere makes it more brittle.

These rough tests, while satisfactory for determining the general quality of the work, do not answer as a basis for design and more refined tests must be used, as before referred to. The most important of these are the tensile and alternating-stress tests. The tensile test can be made in any shop provided with the usual tensile testing machine. The alternating-stress test is not as yet standardized even for unwelded material. The ordinary machine for determining the resistance to alternating stress uses a rather small test piece about ⅜ in. x 2 in. in section which is vibrated at about 1,000 alternations per minute.

Arc-Weld Rail Bonds

Successful Method Described of Rail Bonding Involving a Bond Which Has a Direct Weld Between Copper and Steel

THE extended use of electric-arc welding in the shops and on the tracks of electric railways has resulted in the development of rail bonds which can be applied with the electric arc in one form or another.

The American Steel & Wire Company has developed an arc-weld bond terminal which has a direct weld between the copper and the steel. This eliminates any possibility of the union being disturbed by the heat of the arc. The steel contact surface is in plate form, about ⅛ in. thick throughout, and a large area of copper is provided as a backing for the steel-welding surfaces. They are produced in various forms for application to different parts of the rail, but in all cases the designs are fundamentally the same. The steel of the terminals is in shell form. All parts which are exposed to the arc are of steel about ⅛ in. thick and the steel casing extends to form the terminal sleeve around the conductor where it enters the terminal. For the head of the rail a steel-terminal bond has also been designed.

The joining of the copper to the steel at the factory, leaving a steel to steel weld to be made in the field, is thought to be a big forward step in the art of bonding. The bonding becomes an adjunct of the welding art of necessity and metallic-electrode bonding is in no sense peculiar to the bonds. It is exactly like any other steel weld with which all arc welders are familiar.

Before welding, the terminal makes contact with the rail head along a comparatively thin edge, thus exposing for welding the major part of the rail surface opposite the bond terminal. This enables the terminals to be placed low on the rail heads, with ample clearance for the wheels above and the splice bars below. It is of great advantage on thin rail heads. The welding surface of the terminals of these bonds is concaved so that there is a wide welding angle at the bottom. Less steel is required to attach the bonds than is the case where the welding surface is 90 deg. to the rail. Also the steel current path is kept at the minimum for practical welding. This results in a minimum consumption of welding rod per square inch of contact area and consequently minimum time for installation.

The fundamental argument in favor of the welded bond is the permanency of the contacts. The metallic arc-welding process enables the bonds to be shaped for and applied to all parts of the rail without the need of special equipment. No molds are required and clamps are not essential. They are generally used to hold the bonds in position long enough to "tack" them fast with the arc. The attachment to the rails with steel imparts great mechanical strength to these bond and their theft is therefore discouraged.

The metallic-electrode process enables the bonds to be applied with any form of arc-welding apparatus, motor generator, or any form of ballast resistance set, and the electrode may be positive or negative. The advantage is apparent where there may be several kinds of apparatus on a property. Bonding can be done with each welder, wherever it may happen to be located, thus removing any necessity to transport special apparatus for bonding to every location where repairs are needed.

ARC-WELD RAIL BOND SHOWING SLEEVE CONSTRUCTION OF STEEL TERMINAL

Gas and arc-welding bond steel terminals were described on page 199 of the Feb. 17, 1920, issue, and on page 796 of the April 17, 1920, issue of the ELECTRIC RAILWAY JOURNAL.

New Crane and Hoist Controller

THE Allen-Bradley Company of Milwaukee, Wis., has developed a new line of crane and hoist controllers to supplant its types Q, R and S controllers for the same service. The new controller, made in sizes ranging from 1 hp. to 150 hp., is known as the "clapper-type controller," primarily because all switching and contact making is done with a clapper-switch contactor. The controller is simplified by the use of a graphite compression resistor, mounted within the controller, avoiding the use of grids or wire-wound resistors and the need of step contacts. All speed control is obtained by pressure variation upon the resistor column applied by the control lever. A single lever gives full control in either direction and also actuates the clapper contactors. Steel frame construction is used with pressed steel enclosing covers, reducing the controller weight. Switch cams positively open and close the switch clappers in either direction.

Welding Plant on Motor Trucks

ACCOMPANYING illustrations show two types of self contained portable electric arc-welding outfits mounted on motor trucks. The first of these is used by the Edinburgh (Scotland) Corporation Tramways for making repairs to its lines which are operated by cable, and where electric power is not available. They have also found this welding outfit of use at other parts of their lines as work can be carried out without interfering with normal operation. The second illustration is a portable electric arc-welding outfit used by the United Marine Contracting Company of New York City. Its object is to serve economically both marine and land requirements, and by mounting the equipment on a motor truck it can travel from job to job quickly, and in the case of marine repairs, which constitute the greater part of the work done, such an outfit can be run conveniently alongside boats that require repairs. The equipment of this outfit consists of an electric generator driven by a 40-hp. gas-kerosene engine, which produces direct current of 150 amp. for each welder at 50 volts. The capacity of this machine is two welders.

BUILDING UP RAIL JOINTS FROM WELDING OUTFIT MOUNTED ON MOTOR TRUCK

ROOMY WELDING OUTFIT FOR MISCELLANEOUS REPAIRS

The body is equipped with two reels for carrying 1,200 ft. of copper leads. Welding supplies, such as short lengths of welding wire, welding glasses, hammers, etc., are carried in small compartments built on the underside at the rear of the body. A 40-gal. spare fuel tank is provided, as is also a tank for 65 gal. of lubricating oil for the machinery. The equipment used by the Edinburgh Corporation Tramways delivers from 150 to 250 amp. at 60 volts.

Commissioners Discuss Valuation

National Association Report Shows Majority Favor Investment Basis or Liberal But Not Peak Reproduction Cost

A REPORT of most of the sessions of the convention of the National Association of Railroad & Utility Commissioners held last week in Washington was given in last week's issue of this paper. That which follows completes the report of this convention in so far as it pertains to electric railways.

REPORT ON SPECIAL VALUATION RESOLUTION

At the Thursday morning session of the convention there was a report of the special committee appointed to consider the following resolutions which had been presented by Paul P. Haynes of Indiana at the 1919 convention at Indianapolis:

> Whereas in recent years the cost-of-reproduction method of evaluation has in many instances become the controlling factor in determining the fair value of the property of public utilities, and
>
> Whereas during the past few years there has been an unprecedented increase in the cost of materials and supplies entering into the construction of utility properties, and
>
> Whereas the cost-of-reproduction method of evaluation, although applied with moderating averages, arbitrarily attaches to properties constructed before the high-price period, values greatly in excess of the actual prudent investment therein, in many instances from 25 to 100 per cent greater than such investment, and
>
> Whereas under present abnormal conditions the cost-of-reproduction theory has ceased to perform the service which it was designed to perform, and now leads to unwarranted and unreasonable values which offer little guidance in determining the fair value of the property of public utilities, and
>
> Whereas the continuance of the cost-of-reproduction theory as the controlling factor in public utility valuations will in the future undoubtedly cast a burden upon those utilities which were required by public necessity to make substantial plant investments during the high-price period; now, therefore, be it
>
> Resolved, by the National Association of Railway and Utilities Commissioners, that a continued disposition on the part of commissions and courts to consider cost-of-reproduction or cost-of-reproduction-less-depreciation as the controlling factor in determining the value of the property of utilities will tend to impair scientific and equitable regulation, to permit the establishment of unwarranted and unreasonable values, and ultimately to diminish public confidence in commissions and courts and thereby impair their usefulness; and be it further
>
> Resolved, that one of the obligations of commissions and regulatory bodies is to protect and preserve, in so far as it lies within their power, honest and prudent investment in utility properties, and that, in view of abnormal price conditions now prevailing, equity, justice and a proper regard for the interests of utilities as well as the public seem to demand that in the valuation of public utility property greater weight should be given to the honest and prudent investment therein; and be it further
>
> Resolved, that it is not intended by this resolution to hold that the fair value rule should be abandoned or impaired, but rather that under the fair value rule and in view of abnormal conditions prevailing, a greater measure of justice and equity will be secured by giving greater weight to the honest and prudent investment, and less weight to the cost-of-reproduction or cost-of-reproduction-less-depreciation.

The committee reported that it had sent the resolutions to each state commission and had received thirty-four replies, twenty-one of which favored the resolution, two were unfavorable, four were non-committal and seven gave no expression of their attitude. The following states indicated that they were favorable to the resolution: Texas, New Jersey, Oregon, Oklahoma, Washington, Massachusetts, Kansas, Georgia, Wisconsin, North Dakota, New Hampshire, New York, First District; South Carolina, Michigan, Virginia, Wyoming, Montana, Connecticut, Louisiana, West Virginia and Ohio. New York, Second District, and Nevada reported unfavorably; non-committal replies were received from Maine, Utah, Illinois and Minnesota; acknowledgment of receipt was received from but no action taken by California, Porto Rico, New Mexico, Florida, Maryland, District of Columbia and Vermont.

The committee recommended that no formal action on this report was necessary or desirable. It says: "The investigation has served a useful purpose in that it has brought together the minds of practically all the commissions on this very important question."

In the discussion which followed the report of this committee the consensus of opinion seemed to be that current prices should not be used on account of their very high level; that rate of return should, in general, not be raised too high, but that a liberal policy with respect to valuations finally determined should satisfactorily take care of the present, and probably temporary, situation of high prices and high interest rates. Favorable consideration was given to the proposal recently made by Hagenah & Erickson, valuation engineers, Chicago, that reproduction costs of today be figured on prices projected from a trend-of-prices curve beginning with 1896, but no action was taken except to defer the general subject to the main valuation committee for its consideration.

WHY COAL CAR ASSIGNMENT WAS DISCONTINUED

At this session, also, there was a revival of the car distribution discussion started the previous day. Commissioner Funk and Judge Reed were reinforced in their questions by Commissioner Lewis of Indiana, and M. H. Aylesworth, executive manager National Electric Light Association, presented the case of the utilities, saying in effect that previous to the discontinuance of orders 9 and 16 on Oct. 15 public utilities were getting their contract coal, but that since that date they were getting no coal at all.

Chairman Clark and Commissioner Aitchison of the Interstate Commerce Commission defended the change in rules and made the statement that the change had been brought about largely on account of the abuse of the assigned car privilege granted them. Commissioner Aitchison said that this privilege had been granted for obtaining contract coal for current use, but that many utilities not only tried to pile up reserves through the exercise of this privilege but even went to the extent of reassigning shipments to their advantage. He said that data presented to the commission proved that in three districts alone the coal ordered by consigned cars was equal to the total average consumption of all the utilities in the United States.

Mr. Aylesworth said for the utilities that the utilities would "police" a reissuance of the car assignment order or, failing the confidence of the commission to "police" the order themselves, would finance any "policing" the commission might authorize.

At the Friday sessions important reports were heard from several committees, among them the main valuation committee, which referred chiefly to the railroad valuation work of the Interstate Commerce Commission; the committee on publication of decisions and orders of state commissions, and the committee on statistics and accounts of public utility companies. The last-named committee presented suggestions for standard classifications for gas corporations and for electric corporations. It has this to say with reference to other systems, including, presumably, electric railways:

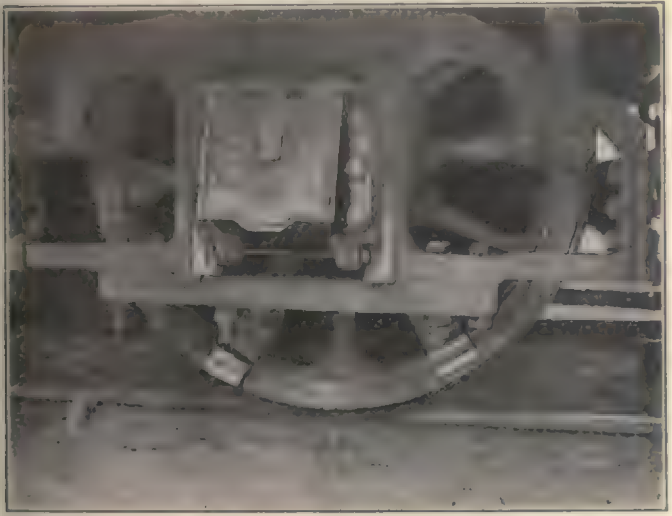
"When it became apparent that the inevitable lack of time necessarily would restrict the number of classes of utilities for which uniform systems could be completed the committee centered its efforts on the electric and gas systems, believing the greatest good could be accomplished through conducting its work in this order, and it was further influenced in this belief through the number of suggestions favoring the adoption of the Interstate Commerce Commission's systems, wherever prescribed, subject to future revision, the essentials of which would still leave the Interstate Commerce Commission's systems substantially intact."

APPOINTMENT OF COMMITTEES

The president-elect, J. A. Perry, announced the appointment of the executive committee for the coming year, as follows: Chairman, Carl D. Jackson, Wisconsin; Joseph B. Eastman, Interstate Commerce Commission; E. I. Lewis, Indiana; Clyde M. Reed, Kansas; R. Hudson Burr, Florida; Alfred M. Barrett, New York; J. J. Murphy, South Dakota; James A. Perry, president (ex officio); James B. Walker, secretary (ex officio).

Bringing in a Crippled Locomotive

THE Inland Empire Railroad has a number of alternating-current locomotives which are used in heavy freight service on its Colfax-Moscow line. Recently one of these locomotives fractured a tire when out on the road and the master mechanic, M. G. Charles, had on his hands the problem of getting the machine into such shape that it could be brought back into the shop. How he did this is shown in the illustration.



EMERGENCY RETAINING CLAMP FOR FRACTURED ELECTRIC LOCOMOTIVE DRIVING-WHEEL TIRE

The device consisted simply of a set of split clamps placed on alternate spokes. These clamps were roughly forged from strap steel in such form that they bind the spokes tightly and at their outer end form guides for the tire so that it cannot slip off. The fracture in the tire was also welded to insure continuity.

A revised edition of the standard specification for portland cement has been issued by the British Engineering Standards Association, the office of which is 28 Victoria Street, S. W. 1, London, England.

Symposium on Lightning Protection

Manufacturers' Engineers Explain Present Status of New Types of Arrester and Operating Engineer Gives Results of Investigations

THE 365th meeting of the American Institute of Electrical Engineers, held at the City Club, Chicago, Ill., on Friday, Nov. 12, in conjunction with the Western Society of Engineers, was devoted to the subject of lightning protection. Four papers, presenting different phases of the subject, were read. The titles and authors of these were as follows: "Lightning Arrester Spark Gaps," by C. T. Allcutt, Westinghouse Electric & Manufacturing Company; "Life and Performance Tests of 'O.F.' Lightning Arresters," by N. A. Lougee, General Electric Company; "Studies in Lightning Protection on 4,000-Volt Circuits," by D. W. Roper, Commonwealth Edison Company, and "Electrostatic Condensers," by V. E. Goodwin, General Electric Company. The meeting was held under the auspices of the Chicago section, of which J. R. Bibbins is chairman, and the protective devices committee, of which Mr. Roper is chairman.

The investigation reported by Mr. Roper was declared to be one of the most comprehensive studies based on actual experience ever recorded on this broad subject of lightning protection in power and lighting work.

President A. W. Berresford, of the Institute, was present. He spoke on the subject of the Federated American Engineering Societies, pointing out that thus far there has been accomplished only a broad enabling act to make the Federated Societies possible, and under which the details of operation will be worked out. He said that the object of the federated organization is to provide the engineering profession with a body competent to represent it in a broad way.

F. K. Copeland, president Western Society of Engineers, which has not yet joined the federated movement, addressed the meeting briefly as to the position of the Western society, indicating that the society was taking a neutral position until there has been time to consider the proposition from all angles.

The meeting was preceded by a reception and dinner at which J. R. Bibbins presided and presented Mr. Berresford, who took charge of the technical session in the evening. During the day following the meeting arrangements were made for inspection trips to the Mark Plant of the Steel & Tube Company of America, to one of the automatic substations of the Chicago, North Shore & Milwaukee Railroad, at Lake Bluff, Ill., and to the Northwest Station of the Commonwealth Edison Company in Chicago. Announcement was also made by a representative of the Chicago, Milwaukee & St. Paul Railway that one of the new electric locomotives was on exhibit near the loop for the benefit of the engineers who were interested.

Abstracts of the four papers presented at the meeting are given below.

Mr. Allcutt's paper was a supplement to one on the same subject presented by him before the Institute in June, 1918. This was abstracted in the issue of the ELECTRIC RAILWAY JOURNAL for Aug. 10, 1918, page 241. In the earlier paper he described a type of lightning arrester spark gap which will discharge a high-frequency disturbance at a voltage considerably less than the normal-frequency discharge voltage. This type of lightning arrester, which has now come to be known as the "impulse gap" arrester, was then in the experimental stage. It has since come into extensive commercial use and the purpose of the present paper was to present data as to its operation and to discuss some of the features upon which the protective value of the gap depends.

Mr. Allcutt explained that a handicap to the electrolytic arrester is that it must be connected to a line through a spark gap, as permanent connection to the line will result in overheating and ultimate destruction of the arrester. It is necessary that the spark gap which connects the arrester to the line be so adjusted that it will not discharge normal line voltage. It is highly desirable, however, that the spark gap should discharge high-frequency disturbances at the lowest possible voltage in order to obtain a high degree of protection against such dangerous disturbances. Herein lies the value of the impulse gap.

The gap proper consists of two sphere-horn electrodes, which are connected respectively to the line and to an electrolytic arrester in the usual manner. In addition to these main electrodes, an auxiliary electrode is provided which is connected to one of the horns through a condenser and to the other horn through a similar condenser and a high resistance. If the auxiliary electrode is placed half way between the main electrodes, the gap will be virtually cut in half for high-frequency disturbances because the impedance offered by the resistance element is very much greater than the impedance of the condensers. Obviously, the result is a gap which is most sensitive to high-frequency discharges and consequently can have a higher voltage setting for normal frequency. In practice actual condensers are not used, but pin insulators having the necessary electrostatic capacity take their places in maintaining the auxiliary electrode at the proper potential. The unbalancing resistance is furnished by resistors inclosed in porcelain tubes mounted on a porcelain pillar. The auxiliary electrode is a pointed brass rod 0.08 in. in diameter, mounted on a substantial iron arm. Mr. Allcutt gave in his paper the results of many tests of modified forms of impulse-gap arresters and promised more data at a later date.

Mr. Lougee gave the results of tests made with the oxide-film (O.F.) lightning arrester developed more than two years ago.* He said that several hundred arresters of this type, up to 73,000 volts rating, are now installed on both indoor and outdoor circuits. Higher voltage units will soon be in service. This arrester consists of cells with lead peroxide filler. The cells consist each of two sherardized steel disks on the sides of a porcelain ring, the interior space being filled with the peroxide. One of the disks is covered with a varnish film, or both may be covered.

Mr. Lougee summarized the results of tests made to duplicate, in a short time, actual operating conditions encountered during an extended life in normal service. Some arresters which have been subjected to this sort of intensive test during the past two years or more, corresponding to several times this period in actual service, have shown up well. Sample oscillograms given by the author indicated some of their characteristics.

The paper by D. W. Roper continues the account of investigations recorded in a paper by him presented before the Institute in 1916. The primary object of that paper was the reconciliation of the differences between laboratory experiments and experience in service in this field. A main purpose of the investigations forming the basis of both papers was the determination of the relative merits of the several types of lightning arresters installed on the 60-cycle distribution system of the Commonwealth Edison Company in Chicago. Data obtained from practice over a long period were used by Mr. Roper in the preparation of curves showing the relation of "density of arresters"; that is, number per square mile, and the rate at which transformers were burned out, or fuses were blown. He also outlined a specification which he thought summarized the results of experience with several types of arresters. These were as follows:

1. The arrester must consist of a number of gaps in series with a resistance, with the number of gaps and the amount of resistance properly adjusted to the line voltage so that the dynamic arc following a lightning discharge will be quickly broken without damage to the arrester.
2. The resistance rod must have the resistance uniformly distributed throughout its length, so as to prevent the progressive short-circuiting of the rod with heavy lightning discharges and the destruction of the arrester which will follow.
3. The amount of resistance in the resistance rod should not be seriously affected by repeated heavy discharges.
4. The leads for connecting the arrester to the line should leave the arrester so that they will form drip loops, and the leads should be so arranged that the arrester can be connected to a line wire on either side of the arrester.

For low maintenance cost the following features are desirable:

5. The enclosing case should be of fireproof insulating material that is not affected by the weather; and it should be constructed so as to protect effectually the metal parts from the weather, and to prevent accumulation of dust on the gaps.
6. The gaps in the arrester should be between parallel plates, disks, or rings instead of between cylinders or spheres so as to permit repeated heavy discharges without seriously altering the length of the gaps.
7. The arrester should be constructed so that in the event of the failure of the arrester to interrupt the dynamic arc the enclosing case will be shattered by the heat so as to give some visual evidence of the trouble and result in the opening of the circuit.
8. The arrester should be without moving parts or parts which require inspection, renewal or adjustment and should preferably be made in the form which cannot be inspected or repaired without removing it from the pole.

Mr. Roper said that experience with the arresters covered by his investigation indicates that several types are now available which comply with the above specifications. He closed with a summary of conclusions, but cautioned against the attempt to compare the results secured by lightning arrester protection in Chicago with those in other localities without giving due consideration to all of the performance factors.

The last paper in the series, by Mr. Goodwin, was a plea for greater appreciation of the condenser in practical work. This, he said, has a wide field of application in electric circuits, for power-factor correction, for improvement in line regulation, for protection from lightning and high-frequency disturbances, etc. He listed the following advantages of the electrostatic condenser for power work:

1. As the apparatus is stationary, it requires no attention.
2. The power loss is small because the equipment has high efficiency.
3. With reliable condensers the maintenance cost is practically nil.
4. The corrective kilovolt-amperes can easily be increased or decreased by cutting sections in or out.
5. The outfit can be connected to any parts of the system and thus provide correction at the points where the greatest saving can result.
6. Condensers are noiseless and require no special foundations.
7. The first cost for small installations is low.
8. Condensers can be used to improve line regulation.

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*See issue of ELECTRIC RAILWAY JOURNAL, July 20, 1918, page 101.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Toledo Board Named

Board of Control Will Supervise Enforcement of New Service-at-Cost Ordinance

The members of the board of control for the operation of the new cost-of-service franchise at Toledo have been named by the commission which drafted the ordinance. David H. Goodwillie, former service director of the city and head of the commission which placed the valuation on the railway property of the Toledo Railways & Light Company, has been selected to fill the six-year term. W. W. Knight, vice-president of the Bostwick-Braun Company, wholesale and retail hardware, and one of the most aggressive members of the cost-of-service commission, has been appointed for the four-year term. Henry C. Truesdall, president of the Toledo Clearing House Association, of the Union Savings Bank, and vice-president of the Northern National Bank, will serve for the two-year term.

The appointees are considered both by the public at large and by the officials of the Rail-Light to be well qualified for their work. It is the general opinion that they represent the spirit of the cost-of-service commission.

WILL BEGIN WORK SOON

The first duties of the board when it is legally empowered to do business upon the acceptance in writing of the ordinance by the Toledo Railways & Light Company, and the Community Traction Company, and the formalities involved in the transfer of railway property from the former to the latter and the filing of an agreement with the city, will be to select a transportation commissioner to represent the city and the re-routing of the present car lines.

The Central Labor Union submitted eleven labor representatives to be considered in the selection of the three members of the board of control but they arrived too late for consideration by the commission. The eleven names submitted by the Mayor included one woman—Mrs. S. M. Jones, wife of the former Toledo Mayor of "golden rule" fame.

In announcing the result of their choice, the service-at-cost commissioners said:

> We wish first, however, to voice our sincere appreciation of the confidence you place in our judgment by expressing your intention to appoint the men we select. It is a responsibility we might well evade, were we not so deeply concerned in knowing the city's and the car riders' interests under this ordinance will be capably and honestly protected.
>
> Our commission is particularly pleased to be able to suggest men of such diversified experience, and hence exceptional fitness for all of the various responsibilities which will devolve on the board of control, and to have them willing to serve.

The final date for the franchise ordinance to go into effect will be Jan. 30. It may be put into effect at an earlier date if the companies involved in the transfer of property fulfill the three qualifications for acceptance of the ordinance.

TRACTION SETTLEMENT APPLAUDED

The passage of the cost-of-service plan has been received with the most enthusiastic commendation by the city's business men. The local railway situation has kept the lines from expanding and has hampered city growth for nearly fifteen years. Prospects of relief from a condition of that kind within a year have brought a new feeling into the business life of the city.

Officials of the Toledo Railways & Light Company are pleased at the victory scored at the polls. They have been working for nearly ten years in an effort to get some kind of a settlement of the traction question. Henry L. Doherty at one time during the negotiations admitted that the cost-of-service measure drawn by the Milner commission was the best that he had seen. However, he has felt rather dissatisfied with the proposition on account of the fact that he was almost forced to yield to a valuation of $8,000,000.

This brings up one of the most interesting of the historical phases of the present situation. In 1914 there was agitation for municipal ownership and a valuation of $9,000,000 was placed upon the lines. During the last year—it is just a year ago since the famous "ouster" went into effect—negotiations have involved a valuation under city auspices. The city-appointed commission headed by Mr. Goodwillie fixed the valuation at $7,110,000 on a prewar basis of prices. They admitted that the replacement valuation would exceed $12,000,000. Mr. Doherty dropped his price to $9,000,000.

Striking Linemen Return

A strike of linemen employed by the Tri-City Railway & Light Company, Davenport, Iowa, has been settled. The men have accepted a wage scale of 77½ cents an hour. This is the scale offered the men a few days after they went out on strike in April. At that time the linemen refused the offer and demanded $1.25 an hour. The union men are now willing to return to work with the non-union men. Twenty-eight men went on strike last April. Twelve have returned to work. At the time the strike was called the scale was 70 cents.

City Ownership Proposed

F. W. Strickland Suggests that City Purchase Dallas Railway—Rate Increase Alternative

Municipal ownership of the Dallas (Texas) Railways or granting by the city of a rate sufficient to give the present company a fair and reasonable return on property value, is proposed by J. F. Strickland, president of the Dallas Railway, as the only means of meeting the present conditions that are retarding the development of the local transportation system. Mr. Strickland sets forth his views in a communication addressed to the Mayor and Board of City Commissioners.

In reply to Mr. Strickland's letter, the Mayor and Board of Commissioners have announced that any alteration of the present franchise of the Dallas Railway or a new franchise will receive consideration of the municipal authorities only under certain conditions, and that any proposed changes would be submitted to the voters at the election to be held next April for their approval.

CITY ASKS GUARANTEES

The company is also informed that no action of any kind will be taken on any proposal to amend the present franchise or grant a new franchise until commitments have been received from the company that it will make extensions and improvements necessary for the growth of the city.

Mr. Strickland states that 17.86 per cent of the company's gross receipts have been invested in maintenance, although the company is required to invest only 10 per cent. This investment has amounted to $1,189,572. The letter says in part:

> As you know, since the beginning of operation under the present franchise on Oct. 1, 1917, the company has been under the supervision of your utilities department, and reference to the monthly reports which have been submitted by the company to the supervisor of public utilities will show that for the thirty-six months of operation, beginning Oct. 1, 1917, and ending Sept. 30, 1920, the company has failed to earn its permitted return of 7 per cent on the established property value, by $618,574. The average rate of return on property value for the thirty-six months has been 4½ per cent, while the rate of return for the month of September, 1920, just passed, was only 3.41 per cent. . . .
>
> It would seem, therefore, that the solution of the problem resolves itself into the following alternatives:
>
> Either the purchase of the railway property and operation of the same by the city of Dallas, or the granting by the city to the Dallas Railway Company of such a franchise as will permit it to earn a return on its investment sufficient to establish its credit and attract new capital to the enterprise.
>
> Should it be the desire of your honorable body to enter into negotiations with the company looking toward the purchase of the railway property, we would be very glad to discuss the same at any time designated by you.

Graduated Return to Induce Economy

Proposed Service-at-Cost Franchise for Akron Lines Provides Return Based on Fare— Buses for Outlying Sections

A new franchise embracing a number of unique features has been agreed upon between the Northern Ohio Traction & Light Company, Akron, Ohio, and the city of Akron, for the operation of the company's local lines. This franchise is the result of several weeks of negotiation between officials of the company and the members of the public utilities committee of the City Council, assisted by the city administrator and a traction expert. It was presented to the Council on Nov. 9, and while no vote has been taken it is said to meet the approval of practically all members of that body. The grant is for a term of twenty-five years and is based on the service-at-cost plan. It provides for the appointment of a public utilities commissioner, who is to "act as the technical adviser of the City Council and all city officials in all matters affecting the interpretation, construction, meaning or application of any of the provisions of the ordinance and all action thereunder affecting the quantity or quality of service, the cost thereof, or the rate of fare."

THE ordinance mentions no fixed valuation at present, but there is a section which provides that the valuation shall be fixed by an appraisal board, consisting of one appraiser to be chosen by the city, one by the company and a third by the United States District Court. The unusual features of the contract are:

1. Incentive for economical management. The basic rate of return is 7 per cent, but if the fare is held at 4 cents the rate of return is to advance to 8 per cent; if held at 5 cents it is to be 7½ per cent. The present rate of fare is 5 cents.

FEEDER BUS LINES PLANNED

2. Provides for an "auto bus system" to be operated by the company. In sections of the city where transportation, aside from street railway transportation, is deemed necessary the company is to operate the buses under city control.

3. New paving between tracks is to be done by the city, but the company is to keep this paving in repair.

4. An amortization fund is to be established after the franchise has been in effect fifteen years which shall be sufficient to meet the capital value at the expiration of the franchise period —twenty-five years.

5. Arbitration upon all points of disagreement, the United States Circuit Court of Appeals to select the third arbitrator.

6. The city is given the right to purchase or lease the property upon one year's notice at the valuation fixed by the appraisal plus subsequent additions to the capital value.

The initial rate of fare is fixed at 5 cents for a period of thirty days from the effective date of the ordinance, or until the valuation appraisal is made. The schedule of fares fixed in the contract is as follows:

4 cents cash, 5 tickets for 20 cents.
5 cents cash, 10 tickets for 45 cents.
5 cents cash, 5 tickets for 25 cents.
[illegible] cents cash, 10 tickets for 55 cents.
6 cents cash, 5 tickets for 30 cents.
7 cents cash, 10 tickets for 65 cents.
7 cents cash, 5 tickets for 35 cents.
8 cents cash, 10 tickets for 75 cents.

It is further provided that the rate shall be adjusted above and below the steps in this schedule in like reductions and increases as such reductions or increases may be necessary under the service-at-cost plan, except that unless otherwise agreed the fare shall not exceed 10 cents. No rate is fixed for "owl" car service, but the contract provides that the public utilities commissioner is to designate the rate charged between 12:30 a.m. and 4:30 a.m.

RETURN VARIES WITH FARE

The section governing fare changes and rates of return provides that whenever the rate of fare is 6 cents straight or higher the rate of return to the company on the property value of the system shall be 7 per cent; but that as the fare decreases in the fixed steps the company's allowed rate of return is increased for each lower step ¼ of 1 per cent above the rate of 7 per cent for the period only during which lower steps of fare shall obtain. The minimum period during which a given fare shall obtain is fixed at three months. In other words, the rate of return for the corresponding ticket rates of fare will be 7 per cent for 6 cents or higher, 7¼ per cent for 5½ cents, 7½ per cent for 5 cents, 7¾ per cent for 4½ cents and 8 per cent for 4 cents.

The contract stipulates that no contribution, subscription, gift or donation by the company shall be charged to operating expenses and that employees of the general offices shall not be given free transportation.

The company operates interurban lines in and out of Akron. Its terminal building is included in the valuation of the property and power shall be sold for use on the city system at the rate of 1½ cents per kw.-hr. for a period of five years, after which a new agreement is to be made as to the cost of power.

SERVICE QUALITY GUARANTEED

In the matter of service the company pledges itself to operate cars of a modern design equipped and furnished with such improvements and appliances as shall be deemed by the city to be necessary and proper for the safety, health, convenience and comfort of the passengers and the public, and to operate cars in such numbers, at such intervals and under such rules and regulations as the city may from time to time require. The city reserves to itself the entire control of the service, including the right of fixing schedules and routes, the character of new cars, the right to increase or diminish service, and the right to order reasonable changes in routes and terminals of interurban cars.

Either the company or the city may propose extensions, betterments or permanent improvements. Should they fail to agree upon such extensions a court of arbitration is to be available. The city may at any time build extensions to tracks and distribution facilities of the city system and upon the capital value of such additions the city is to receive the same return as the company.

At any time when the ordinance or any renewal or extension has less than ten years to run the company is given the right to create an amortization fund by making monthly charges to operating expenses and deducting the amounts from gross revenues, which amounts, together with the interest and other accumulations, if any, shall at the termination of the grant or at the termination of any renewal or extension equal a sum corresponding to the then property value less an estimated salvage value. This amortization fund shall be under the joint control of the city and the company. In the event the grant is renewed or extended the amount at that time in the amortization fund may be used for extensions, betterments or permanent improvements, the value of which shall not be added to the property value, or the money may be used for the purpose of reducing the then property value.

MONTHLY ACCOUNTING PROVIDED

Any discount and expenses resulting, or commission and expenses paid in the furnishing of money by the company for extensions, betterments and permanent improvements or for refunding shall be amortized monthly and included in the operating expenses over the life of the securities sold to provide any or all of the necessary money. If at any time the cost of money furnished by the company for extensions, betterments and permanent improvements expressed in annual percentage exceeds the rate of return allowed, then the difference between the allowed rate of return and such annual cost shall be charged to operating expenses. All renewals or replacements are to be added to the property value and all property sold shall be deducted from property value.

The city reserves to itself and the company grants to the city the right to purchase and take over at the end of any two-year period from the effective date of the ordinance the entire city system by giving the company not less than one year's written notice. When the city purchases the property it shall pay the then property value but no franchise value. The same terms apply in case the city desires to lease the property.

The city is given the right to use free of charge the poles of the city system for fire alarm, patrol or public lighting purposes.

In case the company fails to conform to any of the conditions of the contract a penalty of $40 a day is incurred. The company is also required to furnish a bond of $250,000 for faithful performance of the contract.

Hydro-Radial Terminal Planned

In giving further evidence during the week ended Oct. 30 at the sitting of the Canadian Hydro-Radial Railway Commission F. A. Gaby, chief engineer of the Hydro Commission, admitted that the site of the old Union Depot, now used by the steam railways, had been considered by the commission as a possible terminal for the radial lines which will be run into the city of Toronto from the east and west of Ontario.

The daily increase of traffic on the Danforth and Gerrard lines of the Toronto Civic Railway during August was at the rate of 12,000,000 passengers a year. The Hydro-radials expected to handle about 25 per cent of this traffic when the lines are run downtown to the terminal in the heart of the city. The fare will be 5 cents for a distance of about 5 miles.

It was stated by Mr. Gaby that the proposed London, Stratford and Guelph radial line was to be abandoned following upon the plans now being considered for acquiring the Toronto Suburban, which runs from Toronto to Guelph. It is expected that arrangements can be made to secure running rights over the Grand Trunk Railway tracks between Guelph and Galt and Galt and Elmira.

Public Trustees Attacked

Mayor Roscoe Walsworth of Revere, Mass., has appealed to Governor Calvin Coolidge to hold an inquiry into the management of the Revere District of the Eastern Massachusetts Street Railway with a view to a reduction of fares and an improvement of service. Mayor Walsworth asks for a public hearing on the conduct of the affairs of the district by the public trustees of the railway, and calls for the removal from office of such of the trustees as may be proved incompetent.

Fares on the Bay State lines were recently increased through the elimination of transfers and the raising of the ticket rate, the cash fare remaining 10 cents. The advance was made necessary by the award of an increase of 11 cents an hour to the railway's employees by a board of arbitration. The wage advance will add approximately $1,400,000 annually to the cost of operating the system. The only district exempted from the fare increase was that including the city of Fall River, which has been paying its way under the "home rule" plan.

The Mayor of Lawrence at a recent meeting of the City Council demanded that the members of the "home rule" committee which has been in charge of the Lawrence Division of the Bay State, tender their resignations.

Highest Court Denies Injunction

Plea of Detroit United Railway Refused by United States Supreme Court—City Orders Equipment, Disposes of Bonds

The injunction asked by the Detroit (Mich.) United Railway prohibiting the city of Detroit from continuing with steps already taken leading to the acquisition of municipally owned street railway facilities has been denied by the Supreme Court of the United States. The suit was brought by the D. U. R. on the grounds that the municipal-ownership ordinance is confiscatory and contrary to the Federal constitution. Two motions are now before the Supreme Court on the appeal of the suit of the D. U. R. for an injunction. The appeal had been denied by the District Court. A brief has been filed by Charles Evans Hughes, who has been retained as counsel for the Detroit United, asking that the city be enjoined from selling bonds for the financing of the municipal street railway and from proceeding with construction. If the injunction is not granted, it is asked that the case be advanced for trial.

CORPORATION Counsel Wilcox for the city of Detroit asks that the case be dismissed as no federal question is involved. A second motion asks that if the first be denied, the court affirm the judgment of the District Court, whose decision was to the effect there was no basis for the D. U. R.'s suit. Finally it is asked that if neither of the first motions be granted, the case be advanced for trial. Jan. 3 has been set by the Supreme Court as the date for hearing the arguments in the case.

CITY GOING AHEAD

In answer to the contention of interests opposed to the proposed municipal system in Detroit to the effect that the State Public Utilities Commission has no power to grant a municipal line rights to cross the tracks of a privately owned utility, it has been stated by the city street railway commission that no trouble is anticipated on that point.

The reason that no municipally owned line has been laid across the D. U. R.'s tracks is given as the fact that the special trackwork needed for such a crossing has not yet been received. This work is under contract but has been deferred as winter work which can be done when other work must be suspended.

No legal controversy on the question is expected by Corporation Counsel Wilcox. It is held that if the Public Utilities Commission should decide that it lacks the power to grant this right to cross, the situation would revert to the time before the formation of the commission, when one public utility had the right to cross the property of another. No difficulty ever occurred in the scores of times such situations occurred before.

City lines will cross non-franchised lines and day-to-day agreement lines of the D. U. R. where, according to Corporation Counsel Wilcox, the city's rights are unquestioned. The new D. U. R. Northwestern belt extension will also cross one of the city lines.

In case of attempted obstruction on the part of the D. U. R. there are many lines, according to Mr. Wilcox, which could be pursued to make such obstruction unlikely, one of which would be to bar all interurbans from entering the city. This could be done by a councilmanic ordinance limiting the weight of all cars running on city streets.

The street railway commission's recommendation that twenty-five one-man safety cars be bought for the municipal railway has been concurred in by the Council, despite the adverse report of Councilman Kronk, who investigated the value and use of these cars on a recent trip to Eastern cities where one-man cars are being used.

It was the opinion of some of the Councilmen that according to the city charter the Council could only accept or reject tentative routes but could not decide on equipment and that therefore there was nothing else to do under the charter but to concur in the commission's recommendations in regard to the cars. The one-man cars are planned for use on the light traffic lines only.

MORE BONDS SOLD

Acting upon the recommendation of the city comptroller the Council has authorized the sale of $1,000,000 worth of street railway bonds to a New York firm for further financing the municipal system. The bonds are 5½ per cent bonds, but at the price bid, 103.17, the interest rate to be paid by the city will be approximately 5¼ per cent. The recent bids are reported as the first in which a private party has been high bidder on the street railway bonds. This authorized sale brings the amount of bonds authorized up to $2,750,000 and leaves $12,250,000 yet to be sold.

In discussing the local traction situation, the Detroit United Railway through its publicity department states that the opponents of service-at-cost settlements have never been able to produce a single valid argument against the merit of fundamentals underlying the proposal. A plan of unified operation and unified fares without the taxpayers having to dip into their pockets, made slim by a multitude of taxation requirements and demands, awaits the people of Detroit.

The piece-meal undertaking, according to the D. U. R., is in itself a service-at-cost proposition—if the city charter is not persistently violated by the authorities—the big and important difference between the two being that under municipal piece-meal all the costly extravagances of municipal spending must be met while the service-at-cost contract with a company to enter the service gives to the riders, through lessened costs, the economies practiced by private companies.

Indiana Committee Working with Commerce Bodies

The Indiana Committee on Public Utility Information, of which Charles L. Henry is chairman, is endeavoring through the local utility men in various communities to bring about the passing by chambers of commerce, boards of trade, rotary clubs, etc., of resolutions recognizing the difficult situation in the public utility industry, that good public utility service is a paramount issue, that the utilities are entitled to a measure of co-operation on the part of the public and that in general those who provide such service are entitled to rates that will cover the operating expenses and give them a reasonable return on their investment. The effort to secure the adoption of such resolutions in various cities was inspired by action of this character taken by the Chamber of Commerce of South Bend, Ind., recently.

Wage Rehearing Again Denied

Denial of a motion for a rehearing of its recent wage award of 5 cents an hour increase in the pay of employees of the United Railways of St. Louis has been announced by the Public Service Commission of Missouri. The decision was unanimous. The employees had asked for 35 cents an hour increase, the commission sitting as a board of arbitration in the case. The men are now paid 50, 55, and 60 cents an hour, according to the length of service. This was the second denial of a motion for a rehearing by the commission. The second motion was filed after the carmen's union had unanimously voted not to accept the award.

The men declared that David E. Blair, a member of the commission who heard the presentation of the case, resigned before a decision was reached and did not vote on the decision, but that the deciding vote on the award was cast by Mr. Blair's successor, John Kennish, who had heard none of the case. Edward Foristel, attorney for the men, said that he felt the award was disappointing, but that he would advise the men to stand by the decision, inasmuch as they had agreed previously to accept whatever decision the commission rendered. He said he would present the claims of the men to the commission in December, when the present rate of fare expires and the company appears before the body.

May Build Oklahoma Interurban

Plans for building an electric interurban line from Oklahoma City to Muskogee, Okla., via Henryetta, which were begun before the war but were halted, have again been taken up and it is believed they will be carried through to completion at an early date. R. D. Long, promoter of the enterprise, has already spent about $50,000 on preliminary surveys. Mr. Long has just returned from the East and he reports that he has been assured co-operation of Eastern financiers.

Plans contemplate the erection of a large power station near Henryetta in the heart of the coal fields for supplying current for the entire line and for cities touched by the railway. The road and power plant, it is estimated, would cost in excess of $24,000,000. Plans contemplate bringing the line into the cities on elevated tracks, thus eliminating all traffic delays and making unusually fast time possible.

Persons interested in the project will hold an early meeting in Muskogee for the purpose of taking action looking to something definite with regard to building the road.

News Notes

Service Restored in Paducah.—Electric railway service is practically normal again in Paducah, Ky., after a cessation of more than three weeks. New generating units have been installed at the power house of the Paducah Electric Company to replace those wrecked by an explosion at the plant a month ago. It has been found necessary to take off cars at night to conserve lighting for commercial purposes.

Ask More on One-Man Cars.—Employees of the Eastern Pennsylvania Railways, Pottsville, Pa., are demanding double wages for the operation of one-man cars. The company has stated that although one-man operators are entitled to an increased scale, it is unable to meet the demands of the men. The dispute had its beginning in September of this year, when the employees declared that the Eastern Pennsylvania Railways had no right to operate this type of car. After the company refused to arbitrate the issue the men struck and the entire system was tied up for five days. Later wage arbitration was agreed upon.

City's Plans Take Shape.—Grover A. Whalen, Commissioner of Plant and Structures of New York City, is completing arrangements for taking over the lines of the Staten Island Midland Railway, Richmond borough. Under the terms of an agreement approved by the Board of Estimate the city will operate the road for a period of one year beginning about Dec. 1. John J. Kuhn, receiver of the Richmond Light & Railroad Company, has signed a contract whereby the latter company will permit the city to use its tracks through St. George and Tompkinsville. The Richmond Light & Railroad Company will also supply the city with current at cost.

"Scribner's" Has an Article on Utilities.—James Edwards has contributed to *Scribner's* for November an article "The Public Utility Field." To the man actively engaged in public utility work there is nothing particularly new in what Mr. Edwards has written, but he has presented some of the utility problems in a way that should help to a better understanding of the problems of the industry by the general public. He says that it is fundamentally true that the people as a whole have a keen sense of justice and in the long run will arrive at a correct decision, and while they are entitled to and will insist on reasonable rates they are willing to pay for good service.

More Authority for Toronto Commission.—At a meeting of the City Council of Toronto, Ont., on Nov. 9 an ordinance was passed vesting in the Toronto Transportation Commission complete control of the city streets with respect to the construction and operation of tubes or of motor buses. The commission was recently appointed in connection with the proposed taking over of the Toronto Railway at the expiration of the latter's franchise next September. The city already has power under the city of Toronto act of 1910 to construct, build, maintain and operate a system of underground railways for the carriage of passengers and freight and may acquire any necessary land therefor under the provisions of the law.

Service Halts in Braintree.—The Eastern Massachusetts Street Railway, Boston, Mass., recently discontinued service in Holbrook and Braintree, Mass., owing to the refusal on the part of the towns involved to revoke jitney licenses. The trolley situation in these sections served by the Eastern Massachusetts Street Railway was discussed at a meeting in Braintree on Nov. 3, at which representatives from Braintree, Holbrook and Weymouth were present. Although it was pointed out that jitneys had given good service the citizens expressed appreciation of a dependable railway system. At a later meeting authorization was given to the Board of Selectmen of Braintree to call on the trustees of the Eastern Massachusetts Street Railway to see what could be done in the matter of having service restored. The board later passed an ordinance regulating the buses, following which service was restored.

Charge for Power Before Commission.—Application has been made to the Public Service Commission by the International Railway, Buffalo, N. Y., for an order determining the just and reasonable rate for electric energy to be charged by the Tonawanda Power Company for operation in Tonawanda, North Tonawanda, Lockport, Wheatfield, Pendelton and Newfane after Jan. 1, 1921. A contract made fifteen years ago by the International Railway with the power company expires at that time. The railway alleges the power company seeks an increase in rates after Jan. 1 of approximately 43 per cent. It is the contention of the railway that such an increase in the cost of electricity will cause a burden on operating conditions and an additional hardship on traffic in the territory. The company says the proposed rate is unjust, unfair and unreasonable.

Financial and Corporate

More 10-Cent Cities

Statistics Compiled by American Electric Railway Association Indicate Tendency Toward Basic 10-Cent Fare

Statistics compiled by the American Electric Railway Association showing the rate of fare in effect on Nov. 1, 1920, in the 288 cities of the United States having a population of 25,000 or more, indicate a continuing upward trend in street railway rates and a distinct movement toward a base charge of 10 cents.

The association's figures show that a larger urban population is now paying a 10-cent base rate than is paying the former nickel charge. New York City has been omitted from the calculations because, owing to a complicated political situation, the principal surface lines are in the hands of receivers and various rates, from 8 cents to a flat 5 cents, are in effect, making comparisons impossible.

FIFTY-TWO NICKEL CITIES

The 287 cities, excluding New York City, have a combined population of 32,173,312. Forty-nine cities having a combined population of 4,992,414 are on a 10-cent base rate; two cities with a population of 189,085 have a 9-cent base rate; twenty-seven cities, population 5,191,725, have an 8-cent base rate; eighty-four cities, population 10,415,175, have a 7-cent base rate; fifty-five cities, population 5,283,100, have a 6-cent base rate; fifty-two cities, population 4,222,307, have a 5-cent base rate; and eighteen cities, population 1,879,506, have zone systems which make the rate higher than 5 cents.

The increase in fares as compared to February, 1920, when the association issued a similar statement, is most significant. The 1920 census added some fifteen cities to the group under consideration without, however, affecting the general divisions. Cities in the 25,000 group paying more than a 5-cent fare increased from 192 to 235; the 10-cent cities increasing from twenty-three to forty-nine; 8-cent cities from fourteen to twenty-seven, and 7-cent cities from fifty-eight to eighty-four, while 6-cent cities decreased from seventy-one to fifty-five; 5-cent cities from eighty to fifty-two, and zone system cities from twenty-six to eighteen. Of the fifty-two cities charging a 5-cent fare only four have a population of more than 100,000 and of these there is immediate prospect of increase in two.

DIME FARES IN MANY CITIES

Chicago (on its elevated lines), Boston, Pittsburgh, Seattle, New Haven, Bridgeport, Hartford, Fall River, Lowell, Cambridge and Lawrence are among the large cities having a 10-cent base, while for cash passengers securing transfers, at certain points, the fare in Philadelphia is 10 cents, as it is in Washington for riders transferring between the two separately-owned systems. In certain of the zone-fare cities, such as Providence, Worcester, San Diego, Springfield and New Bedford, the fare for all but the short-ride passengers is 10 cents or more.

With regard to the basic 10-cent fare the association's statement says:

> A study of the statistics prepared by the association and comparison with previous tabulations of the same kind together with the applications for increases pending in various cities seem to indicate that the street car fare in the United States is gradually gravitating toward a flat rate of 10 cents in order to catch up with increased operating costs, which it is claimed by the industry have more than doubled since 1914.

Profit of 0.267 Cent per Fare

The 8-cent fare on the Chicago (Ill.) Surface Lines produced the revenue in August and September indicated in the accompanying statement. The half-fares collected from children brought the average rate per revenue passenger down to a unit slightly below 8 cents. The average rate of fare per passenger for September was 4.47 cents; in other words, 78 per cent of the revenue passengers used transfers. As to the disposition of the revenue per passenger, the first item in the table shows that 4.308 cents is taken for labor alone.

DISPOSITION OF FARE BY CHICAGO SURFACE LINES

	August 1920	September 1920
Passenger revenue.	$ 5,021,478	$ 4,940,323
Revenue passengers carried	63,138,188	62,044,885
Total passengers carried	113,396,053	110,488,632
Average fare, per revenue passenger—cents	7.953	7.962
Disposition:	Cents	Cents
Wages	4.269	4.308
Material, power and other expenses	1.494	1.472
Taxes	.250	.256
Damages	.282	.287
5 per cent on purchase price...	1.060	1.045
55 per cent to city	.329	.327
45 per cent to companies ...	.269	.267
	7.953	7.962

This throws interesting light on the possibility of Mayor Thompson's campaign for 5-cent fares. The total profit after deducting operating expenses and the 5 per cent allowance for interest on bonds is 0.267 cent, of which 55 per cent goes to the city and 45 per cent to the companies for dividends. Recently the Public Utilities Commission decided that the allowed rate of return on the value of the property should be 7.5 per cent. This will reduce the amount available for profit in future months.

Income Increase Shown

$15,000 Net Gain in September Compared with Results in July, $28,000 with August

The net income of the Minneapolis (Minn.) Street Railway increased $15,363 in September, as compared with July, and $28,261 compared with August, according to a report submitted to the City Council by President Horace Lowry. The quarterly income statement is required by the ordinance which granted the company authority to increase the fare from 5 cents to 6 cents Aug. 16.

The report of Mr. Lowry showed the total operating revenue was $571,150 in July, $596,728 in August and $657,066 in September, making a total of $1,824,945 for the quarterly period. The total operating expenses were $383,181 in July, $422,286 in August and $458,390 in September, a total of $1,263,859 for the three months. The net operating revenue was $187,968 for July, $174,442 for August and $198,675 for September, making a total three months' net revenue of $561,086. The total non-operating income was set forth as $1,993 for July, $2,042 for August and $2,567 for September, a total of $6,603 for the three months.

NET INCOME $66,729

The gross income was shown to be $133,551 for July, $120,088 for August and $146,700 for September, a total of $400,340. The total deduction for miscellaneous rents, interest on funded debt, interest on unfunded debt and miscellaneous debits amounted to $82,185 for July, $81,520 for August and $79,970 for September, a total of $243,677, leaving the net income $51,366 for July, $38,567 for August and $66,729 for September, a total of $156,663 for the three months.

Mr. Lowry explained that with fifty-nine additional cars in service at the end of September, the comparisons with July and August regarding the net income would in the following month naturally show a decline, for the service improvement was accelerated in September until the maximum shown in the report was reached.

At the same time, Eugene Lund, city street railway inspector, submitted a report showing an increase of fifty-nine cars operated from Aug. 17 to Sept. 30. In that period, according to the report, 1,015 more car miles were operated on the average weekday.

To meet the rush-hour demands and in carrying out the promise of the company for improvement in service, Foster Hannaford, general manager of the railway, said twenty-five improved type trailers would be in operation this winter. The order for these trailers, similar to one tried on the Nicollet Avenue line, was placed on Oct. 22.

The company is committed to a plan of placing 300 front exit cars in service by early in 1921 and the first six of these cars, remodeled at the Snelling Avenue shops, will be in operation soon, Mr. Hannaford said.

P. R. T. Gaining

Receipts Increase Approximately 20 per Cent Under 7-Cent Fare—Ten Months' Deficit $1,702,120

The gross passenger earnings of the Philadelphia (Pa.) Rapid Transit Company for the first fourteen days of November totaled $1,735,000, an increase of $319,000 over the same period a year ago. Of this amount, $222,400 represents the increase in revenues over and above that which would have been secured through the normal business under the former 5-cent fare without change of the exchange ticket and free transfer privileges. This indicates an increase of approximately 20 per cent in the daily earnings under the 7-cent cash fare, with four tickets for a quarter, effective Nov. 1.

RESULTS EXCEED EXPECTATIONS

In announcing the company's receipts for the first two weeks of the 7-cent fare officials of the company intimated that the results under the new rates far exceeded their expectations. On the basis of the results thus far obtained, the 7-cent fare is expected to increase the company's revenues approximately $7,000,000 annually. In 1919 the company collected $34,739,589 on a straight 5-cent fare. The 7-cent rate, it is estimated, will give the P. R. T. more than $10,000,000 in excess of that figure. The usual increase in the number of passengers carried results in a gain of between $3,000,000 and $4,000,000 annually, so that $7,000,000 is a conservative estimate of actual increases from the new fare.

The company officials said that they did not regard the period taken as a complete test. It comes at the time of the year when the traffic is especially heavy. They contend that January and February must be passed before they will be able to reach a final decision regarding the success of the new rate. On the other hand, receipts are expected to take a marked jump during the rest of November and December. These two months of each year mark the high-water point in the number of passengers carried by the company. The latter part of this month and all of December are expected to result in perhaps $10,000 daily being added to the present receipts of $120,000.

SUMMARY OF OPERATIONS OF PHILADELPHIA RAPID TRANSIT COMPANY

Month ended Oct. 31, 1920		1920	1919	Percentage Change Over 1919
Operating revenue		$3,336,595.71	$3,165,552.88	5.4
Operation and taxes		2,445,370.67	2,140,411.79	14.3
Operating income		891,225.04	1,025,141.09	—13.1
Non-operating income		53,958.52	45,216.09	19.3
Gross income		945,183.56	1,070,357.18	—11.7
Fixed charges		819,815.43	813,550.95	0.8
Net income		125,368.13	$256,806.23	—51.3
Deferred wage adjustment—one month	$187,500.00			
Five per cent return on P. R. T. paid-in capital — one month	125,000.00	312,500.00		
Amount by which gross revenues are insufficient to provide for operating expenses, taxes, fixed charges, and the 5 per cent return upon P. R. T. stock		$187,131.87		

Ten months ended October 31, 1920		1920	1919	Percentage Change Over 1919
Operating revenue		$31,191,329.44	$29,160,983.65	7.0
Operation and taxes		23,005,600.94	20,029,040.98	14.8
Operating income		8,185,728.50	9,131,942.67	—10.4
Non-operating income		476,309.61	441,311.35	7.9
Gross income		8,662,038.11	9,573,254.02	9.6
Fixed charges		8,176,658.71	8,109,495.08	0.8
Net income		485,379.40	$1,463,758.94	—66.8
Deferred wage adjustment—five months	$937,500.00			
Five per cent return on P. R. T. paid-in capital — ten months	1,250,000.00	2,187,500.00		
Amount by which gross revenues are insufficient to provide for operating expenses, taxes, fixed charges, and the 5 per cent return upon P. R. T. stock		$1,702,120.60		

Eighty-four per cent of the P. R. T. riders are using 6¼-cent tickets, leaving only 16 per cent paying the 7-cent cash fare. On Nov. 1, the first day of the higher fare, the sale of tickets approximated $250,000. Every effort is being made by the company to speed up the service so that more space will be available. Schedules have been rearranged and several lines have been rerouted to eliminate delays. On routes 3 and 27 the increased efficiency resulting from these changes will make possible twenty-five additional trips daily.

The income statement of the P. R. T. for October shows that the company will have to overcome a total deficit for the first ten months of 1920 of $1,702,120. If present conditions continue it is expected that more than half of this deficit will be wiped out by the end of the current year. This deficit includes the 5 per cent dividend to the P. R. T. stockholders. The deficit for the month of October was $187,131. The company's net income for the month amounted to $125,368 as compared with $256,806 during the same period one year ago.

Deficit at Rochester

Commissioner Barnes Reports for First Full Month of Service at Cost—Total Loss $33,793

The operating revenue of the Rochester lines of the New York State Railways for September was $4,627 less than sufficient to meet operating expenses and other obligations, according to a report submitted on Nov. 9 by Commissioner C. R. Barnes to the Mayor and the Common Council. Charges for renewals and depreciation were eliminated from the calculations that yielded this deficit or it would have been larger. Under the contract between the city and the company a balancing fund of $300,000 was to be created for the purpose of taking care of losses and profits from operating revenue. The present 7-cent fare was to be reduced should the balancing fund exceed $400,000 or increased should the fund fall below $200,000.

TOTAL DEFICIT $33,793

The contract also specifies that each month at least 2 per cent of the fixed valuation of the physical property shall be placed in a "renewal and depreciation" fund, but this provision may be disregarded by consent of both the company's authorities and the commissioner of railways. Pending the appraisal of the property a valuation of $17,500,000 was established for the purpose of the contract. Under this valuation the minimum amount to be placed in the renewal and depreciation fund each month is $29,166. This charge was made upon the operating revenues of the company in August, but was eliminated in September.

For August a deficit of $71,000 was created. The contract became effective on August 1, but the increased fare was not put in force until August 28. Because of this delay it was decided to spread the August deficit over a period of months. Had this loss been made up immediately and an appropriation made in September for the renewal and depreciation fund, it would have been necessary to increase the fare at once.

A summary of the income statement for the month of September is as follows:

Railway operating revenue	$408,648
Railway operating expenses	302,285
Net revenue from railway operation	106,362
Auxiliary operation, deficit	23
Net revenue from operation	106,339
Taxes assignable to operation	23,728
Net revenue	82,610
Non-operating revenue	1,761
Gross income	84,372
Return on investment	89,000
Deficit	4,627

In accordance with the service-at-cost contract, the above deficit is made up from the balancing fund.

The report of Mr. Barnes follows in part:

> A charge for renewals and depreciation, which under the terms of the contract should be at least $29,166.66, has been excluded from the September statement. This is done by mutual consent, as authorized in the contract, for the reason that the net revenue was not sufficient to provide for such charge. . . .

During the month of August $29,166 was accrued for . . . reconstruction of track on Main Street east now taking place. The original cost of the track being replaced, less salvage, is a complete loss and such loss is charged against this accrued amount. * * *

STATISTICS OF OPERATION
(City lines only)

	Number of Passengers, September
Revenue passengers	5,878,006
Free passengers	119,969
Transfers	1,976,526
Total passengers	7,974,501

Free passengers as shown here are principally employees of the company who ride on free tickets. In addition firemen and policemen in uniform are carried free.

During September 60.64 per cent of the city revenue was derived from tickets; 33.62 per cent of the city revenue passengers used transfers.

In September there were 7.7 city revenue passengers carried per city passenger car mile.

The average rate of fare for full-fare passengers was 6.68 cents, an increase of 33.6 per cent over the 5-cent fare.

Comparison of passenger car miles on city lines operated in September, 1920, with September, 1919, is as follows:

September, 1920	766,585
September, 1919	652,367
Increase	114,218
Percentage increase in service	17.5

The number of revenue passengers carried during September, 1920, on the city and suburban lines included in the service-at-cost contract was 6,092,949. The cost per revenue passenger carried during September, 1920, on these lines was as follows:

	Cents
Labor	3.5740
Power	.3833
Material and supplies	.4957
Casualties	.2680
Miscellaneous expense	.2407
Taxes	.3894
Return on investment	1.4607
Total	6.8118
Average revenue from all sources per revenue passenger	6.7358
Deficit per revenue passenger	.0760

The above expenses do not include any charges for renewals and depreciation which if included would have made the deficit .5547 cents per revenue passenger.

To improve the service generally, especially in the matter of regularity, changes have been made in the operating methods. Inspectors are located at the important points on all lines to regulate and record the movement of cars. At the heavy loading points, additional men are stationed to assist in loading and despatching cars. Four men from the mechanical department are placed at different parts of the city to make immediate possible repairs to cars which become disabled on route. During the rush hours emergency trucks are stationed on the street at various points on the system for the purpose of facilitating their work in removing obstructions from tracks, repairing broken wires and caring for derailed or disabled cars. In addition to the above the service is under the constant supervision of this department, especially during the morning and evening hours. These and other changes made in the operation have resulted in material improvement in regularity of service. . .

In the month of September of this year compared with the same month in 1919 there was an increase of 114,218 city car miles run, or 17.5 per cent, while the city passengers carried in September compared with thirty days in August of this year shows a falling off of 125,869 or 15.5 per cent.

Collateral Sale Nets $265,000

The 181,860 shares of common stock of the American Railways, Philadelphia, Pa., pledged as collateral for the National Properties 4 and 6 per cent bonds, were sold at public auction on Nov. 8, by order of the United States District Court, at the Federal Building, Wilmington, Del., by Francis de H. Janvier, special master. The stock was bought in by the bondholders' protective committee, of which Evan Randolph is chairman, for $265,000, this being the only bid made. The petition filed in the United States District Court at Wilmington in behalf of the above sale was denied by Judge Morris. The court fixed Nov. 19 as the latest date on which objections might be filed.

Attorneys representing the minority bondholders' committee have filed an involuntary petition in bankruptcy seeking to have the affairs of the company investigated. A representative of the minority bondholders is quoted as saying: "When a company is adjudged a bankrupt a referee in bankruptcy is appointed. Such officer would have authority to make investigations as to what caused the company to become bankrupt and make other investigation of its condition we desire."

Bay State Deficits Continue

The report of operations of the Eastern Massachusetts Street Railway, Boston, Mass., for September shows that only three of the eleven "home rule" districts of the company had a surplus after deducting the total cost of service, including an allowance of 6 per cent on the valuation of the property. The remaining eight districts had deficits ranging from $3,747 to $17,612 for the month. All districts, however, showed revenues in excess of operating expenses and taxes. The only districts having surpluses were those including Fall River, Lynn and Taunton.

The above table shows in detail the September operations by districts.

RESULTS OF OPERATIONS, EASTERN MASSACHUSETTS STREET RAILWAY, SEPTEMBER, 1920

District	Total Revenue	Operating Expenses and Taxes	Six Per Cent on Property	Total Cost of Service	Surplus or Deficit
Chelsea	$127,556	$114,568	$20,100	$134,668	Def. $7,112
Melrose-Woburn	80,587	69,665	21,050	90,715	Def. 10,128
Lynn	144,664	112,989	21,550	134,539	Sur. 10,125
Salem	101,235	99,147	19,700	118,847	Def. 17,612
Lowell	125,503	105,900	23,250	129,150	Def. 3,647
Lawrence	77,925	71,098	14,600	85,698	Def. 7,773
Haverhill	41,485	37,768	9,850	47,618	Def. 6,133
Quincy	68,849	58,027	16,200	74,227	Def. 5,378
Brockton	127,658	114,757	28,800	143,557	Def. 15,899
Taunton	40,275	26,743	8,950	35,693	Sur. 4,582
Fall River	120,089	99,442	17,400	116,842	Sur. 3,247

G. E. Plans Stock Issue

The directors of the General Electric Company at a meeting in Boston on Nov. 12 authorized the issuance of $27,500,000 common stock to be offered to stockholders of record Dec. 8 at par at the rate of one share of new stock for every five shares of stock then held. Subscription to the new stock must be made on or before Jan. 20, 1921, and payments are to be made either in four equal installments on Jan. 20, April 20, July 20 and Oct. 20, 1921, or in full at time of subscription. The directors declared the regular quarterly cash dividend of $2 a share and the regular semi-annual dividend of 2 per cent in stock, both payable Jan. 15 to stock of record Dec. 8.

Foreclosure Decree Postponed

Issuance of a decree of foreclosure sale of the properties of the New York (N. Y.) Railways under the provisions of the first real estate and refunding mortgage, the interest on which has been in default for several interest periods, has been postponed by Judge Julius M. Mayer in the United States District Court to the third Monday in January. The junior bondholders' protective committee, represented by B. H. Blanc, opposes the issuance of a decree at this time on the ground that changing conditions are making an improvement in the situation of the company and that a dissolution of the properties at the present time would work an injury not only to the junior bondholders but to other creditors. Joseph P. Cotton, representing the holders of the first real estate and refunding 4s, opposed any further delay and told the court that the interest of the first mortgage bondholders was being curtailed by the accumulating tax liens now amounting to approximately $2,700,000 on the property.

J. G. Bouvier, who represented the creditors' committee, which has claims aggregating $1,500,000 against the company for damages, also opposed the issuance of a decree at this time. Judge Mayer in setting the third Monday of January for final argument in the matter expressed the opinion that recent political events had created a change in the state of mind of the public and that with assurances stated to the newspapers by Governor-elect Miller of his interest in the transit problems the creditors of the company had much more to hope for now than at any time since the receivership began. He asked that a conference of the creditors be called for Nov. 22 to discuss further measures to obviate any necessity for a final foreclosure.

Progress in Ontario Negotiations

Negotiations which have been carried on by Sir Adam Beck, chairman of the Ontario Hydro-Electric Power Commission, for the acquisition of radial railways and power companies in and around Toronto controlled by Sir William MacKenzie, have reached the point where the bondholders must be consulted. Sir William MacKenzie is now on his way to England for the purpose of placing before the bondholders two alternative propositions—one to discount their holdings and sell out for cash and the other to allow the Hydro Commission to assume all outstanding obligations.

The price mentioned is in the neighborhood of $35,000,000, which represents securities sold. If it can be arranged, either the city of Toronto or the Hydro-Electric Commission will take over the obligations, so that very little cash will have to be provided.

Four companies are concerned in the negotiations—the Electrical Development of Ontario, which owns the generating plant at Niagara Falls; the Toronto & Niagara Power Company, owning the transmission lines from the Falls to Toronto; the Toronto Electric Light Company, which distributes light and power; and the Toronto & York Radial Railway, owning and operating the Metropolitan, Scarborough and Mimico Divisions. The capital stock of all these subsidiaries is owned and controlled by the holding company known as the Toronto Power Company.

Westinghouse Offers $30,000,000 of Notes

Kuhn, Loeb & Company, New York, N. Y., have made a public offering of $30,000,000 of 7 per cent eleven-year bonds of the Westinghouse Electric & Manufacturing Company at 94¾ to yield 7¾ per cent. The purpose of the issue is to secure working capital for a fixed period, and the proceeds of the sale of the bonds are to be applied to the payment of more notes payable. The New York Stock Exchange has admitted the notes to trading when issued.

For the six months ended Sept. 30, 1920, billings amounted to $78,771,675, and it is believed for the fiscal year to end March 31, 1921, will exceed sales billed for the previous fiscal year. Income for the six months ended Sept. 30, 1920, after deductions for depreciation, federal and other taxes, amounted to $8,164,875, while interest charges for that period amounted to $751,852.

As of Sept. 30, 1920, current assets were $128,630,880, while current indebtedness, consisting mainly of accounts payable, not due, advance payments on contracts and accruals for interest, federal and other taxes, after applying as of said date the proceeds of the sale of the bonds, amounted to $31,112,486.

Consolidation Still Under Consideration

Any possibility of a consolidation of the traction lines of the Spokane & Eastern Railway & Power Company, Spokane, Wash., and the city lines of the Washington Water Power Company is still well in the future, according to F. E. Connors, vice-president of the former company, who has returned to Spokane from Chicago. Mr. Connors said:

> Nothing will be done in the consolidation matter until President Taylor comes to Spokane and he will be unable to do this for some time. Therefore I do not expect anything definite on the consolidation soon. I went east especially to visit my family and spent most of the time with them. No action was taken on the consolidation matter.

The question of the consolidation of the two lines through purchase by the Washington Water Power Company has been up from time to time in the past. Some months ago engineers of the two companies were set to work to figure out the traction valuation, the cost of connecting the two lines physically, the competing lines that would be eliminated and the resultant saving. While it is assumed that this work has been completed, the results are being held pending consultation of the representatives of the companies.

Financial News Notes

New Director Named.—James Dean has been elected a director of the Manchester Traction, Light & Power Company, Manchester, N. H.

Memphis Doing Better.—The September report of the Memphis (Tenn.) Street Railway shows a surplus of $12,257 for the month. The company has paid renewals and replacements amounting to $19,012 and taxes amounting to $21,338. The report showed that 4,514,393 passengers were carried during the month, only 20 per cent of whom took advantage of the 6½-cent fare.

Will Redeem Bonds.—The entire outstanding issue of three-year 7 per cent collateral trust sinking fund gold notes of the Republic Railway & Light Company, Youngstown, Ohio, dated Jan. 15, 1920, amounting to $1,233,000, has been called for redemption Dec. 6 at 100½ and interest from July 15 to Dec. 6, amounting to $27.42 for each $1,000 note, payable at the First Trust & Savings Company, Cleveland, Ohio.

Road to Be Sold.—Judge George E. Hinman, in the Superior Court, has authorized Robert W. Perkins, receiver of the Shore Line Electric Railway, to sell the property of the Norwich & Westerly Traction Company, Norwich, Conn., and has given him until Jan. 15 next to make the sale, placing the "upset" figure at $191,000. The court also advised that the road be kept in operation until Dec. 1.

Offers Line to City.—J. A. Cusick, president of the Bay Shore Street Railway, Green Bay, Wis., has notified the Green Bay City Council that unless relief is immediately forthcoming for the railway, the company will have to tear up its tracks and sell the cars, ties and rails as junk. Mr. Cusick has offered to sell the property to the city. The company operates about two miles of track.

Abandonment Approved.—The Public Service Commission for the Second District of New York has approved a declaration of abandonment by the Orange County Traction Company, Newburgh, of a portion of its line in the city of Newburgh. The commission denied the petition on Jan. 6, 1920, when the company applied for complete abandonment of its line on Bridge Street, but suggested that the company file a new petition, submitting a declaration of abandonment of a portion of the Bridge Street line.

Property Assessment Protested.—The receivers of the Memphis (Tenn.) Street Railway have given notice that they will seek a reduction in the assessment returned against their property by the State Railroad and Public Utilities Commission and upon which the company must pay taxes to the city. The amount at which the railway's property within the corporate limits of Memphis is assessed is $10,449,887. The holdings of the Memphis Gas & Electric Company are assessed at $9,104,600. The total amount at which the city's public utilities are assessed is $37,009,738.

Reorganization Plan Held Up.—It is reported that the operation of the reorganization plan of the Schuylkill Railway, Girardville, Pa., is being held temporarily in abeyance pending the determination of the ability of the company to meet the obligations required thereby. The interest deferred on Oct. 1, 1919, on the Schuylkill Traction first mortgage 5s of 1943 was paid on Dec. 31, 1919, and has been paid at maturity since that date. No interest has been paid on the Schuylkill Railway first consolidated 5s of 1935 since the maturity of April, 1919. Fares were increased on Oct. 1, 1920, from 5 to 6 cents cash for the modified zone, with twenty tickets for $1 instead of six tickets for 25 cents.

Winnipeg Company Offers Stock—René T. Leclerc, investment banker, Montreal, Que., is offering for subscription at 90, to yield 7¾ per cent, an issue of $3,000,000 7 per cent cumulative preferred stock of the Winnipeg, (Man.) Electric Railway, of par value $100. The issue was recently authorized by the shareholders of the company to retire notes and bank loans. It carries a bonus of 30 per cent in common stock. It is stated that the average annual net earnings of the company for the three pre-war years ended Dec. 31, 1914 (which would have been available for dividends under present issue of preferred stock), were $1,148,193. The average annual net earnings for the three years ended Dec. 31, 1919, were $496,637. The estimated net earnings for the current fiscal year, based on actual figures for the first eight months, are $630,000. The shareholders of the company will vote on Dec. 1 on a proposal to give voting power to the holders of the new issue and to provide that no additional issue of preferred stock shall be made without authority from at least two-thirds of such stock outstanding. At the same time, the shareholders will approve an increase in the common stock from $10,000,000 to $11,000,000.

Traffic and Transportation

Des Moines Value Fixed

Appraisers for City Report That Fare of 5¾ Cents Would Yield 7 Per Cent Return

The report of the appraisers appointed in August by the City Council of Des Moines, Iowa, to make an appraisal of the property of the Des Moines City Railway was made public this week. The report was filed a week ago, but announcement was made by the city attorneys that it would not be made public immediately but "would be held as a club over the heads of the traction company in future litigation." However, after severe criticism of the city's attitude by the daily newspapers, the report was given out in full.

According to the report the present depreciated value of the railway's property is $6,089,989. This is based upon prices in effect Aug. 1 of this year. The report estimates that it would cost to replace the entire property, new, $9,089,989. The actual value of the property on Aug. 1, 1915, which was placed in the franchise granted the Des Moines City Railway at $5,000,000, could not have been more than $3,201,570 and was probably nearer $2,025,678.

FARE RESULTS ESTIMATED

The report follows a survey of the property continuing over three months and fills 1,000 pages. It does not contain an audit of the books of the company which is to be made later under the direction of the City Council. The report does not attempt to fix the rate of fare which should be charged in Des Moines but sets out how much should be charged to secure given rates of return upon the capital.

Based upon the service being furnished in Des Moines at present the appraisers find that a 5⅛-cent fare would pay 6 per cent return on a valuation at the present price level and that in order to get a 7 per cent return 5⅝ cents a passenger would be sufficient. Going into the question of increased service the appraisers state that if the present service were increased by 50 per cent a 7.2-cent fare would yield 7 per cent, 7.1 cents 6 per cent and 6.9 cents 5 per cent.

City officials and attorneys have announced that they are satisfied with the results of the appraisal and that they feel it will lead to a settlement of the local railway controversy. City Attorney C. W. Lyon declares that his policy in securing a settlement of the question will be to first consider the question of service and that he will favor a sliding scale of fares with a reserve fund.

F. C. Chambers, general manager and operating receiver of the Des Moines City Railway, holds that he could see no way in which the report of the appraisers would serve to bring about a settlement of the dispute with the city. Mr. Chambers states that with the exception of the present reproduction value, which he estimates to be from 10 to 15 per cent too low, the values announced by the appraisers are "little short of ridiculous." He calls attention to the fact that the Des Moines City Railway has never paid a dividend and has created no depreciation fund. The depreciated value as of Aug. 1, 1915, he says is "entirely out of the question," as the power-plant alone was worth half the figure announced as the total depreciated value by the appraisers.

Mr. Chambers further states that for the appraisers to offer figures to show what rate of fare is necessary to bring a 5 per cent return on the capital is merely a waste of time, considering the conditions of the financial market at the present time as regards interest rates. The appraisal was made at an expense of $10,000 to the city, which will have to be paid by the taxpayers of Des Moines.

Seattle Bus Operators Seek Compromise

Judge Walter French of the Superior Court has denied a motion of the city of Seattle, Wash., to dissolve the temporary injunction restraining the city authorities from prohibiting the operation of jitneys. The ordinance barring the buses from the streets was adopted by the City Council several months ago to afford relief to the Seattle Municipal Railway. Pending a final decision by the courts as to the legality of the measure, the buses have continued operation. The city will appeal the case to the State Supreme Court. It will be several months before a final opinion can be rendered.

Since the rejection by the voters at the election on Nov. 2 of a proposition to give the jitney men a practically free hand in so far as the fixing of fares and routes was concerned, the bus operators have adopted a more conciliatory attitude. The Sound Transit Company, among others, has offered to accept traffic regulations which it formerly opposed. These regulations have been drawn up by Carl H. Reeves, superintendent of public utilities, and prescribe routes and termini for the buses.

A recent check of jitney traffic made by the city authorities indicates that operation of the buses is resulting in a loss of between $600 and $900 daily to the Seattle Municipal Railway.

Favors Galveston Increase

Special Master Finds Nickel Fare Confiscatory—Company Seeks Injunction to Restrain City

The Galveston (Tex.) Electric Company is entitled to an increase in fare in its Galveston city lines. This is the decision reached by Henry J. Dannenbaum, special master, who has been taking testimony in the case of the Galveston Electric Company vs. the City of Galveston. The company is seeking an injunction against the enforcement of a municipal ordinance limiting the fare to 5 cents. Mr. Dannenbaum finds that the return earned by the company under the 5-cent fare is "insufficient and confiscatory."

DISPUTE OF LONG STANDING

The Galveston fare controversy dates back more than a year. At that time the company made application to the City Commission for authority to increase fares to 7 cents. Its petition was granted. Later a change was made in the city administration and the 7-cent fare ordinance was repealed. The company then went into the United States District Court and asked an injunction against the city to restrain the enforcement of the ordinance repealing the 7-cent fare and to restrain the city authorities in all efforts to prevent the collection of a 7-cent rate. The injunction was sought on the ground that the 5-cent fare, as demanded by the city, was confiscatory and did not permit adequate return on the company's investment.

Mr. Dannenbaum was appointed as special master to hear evidence in the case and to report his findings to the court. Further action on the issue of granting the injunction prayed for is to be taken by Judge J. C. Hutcheson of the United States District Court at Houston and will be based on the report and recommendations filed by the special master.

NET RETURN 1.86 PER CENT

According to figures allowed by the special master, the Galveston Electric Company earned for the year ended June 30, 1920, the sum of only $50,249, or 1.86 per cent on the value of its property. Estimating an earning capacity of 8 per cent, allowed on contention of the complaint, a deficit of $123,000 is shown between the company's earnings of $548,477 for the year and the cost of operation.

The total required revenue is arrived at as follows: Operating expenses, less maintenance, $314,073; maintenance, $80,322; depreciation allowance, $66,824; taxes (including income tax), $37,008; fair return on value, $173,404.45; total, $671,631. The value of the property for rate-making purposes is set down at $2,167,805. The company's figures regarding reproduction costs, depreciation and other items were accepted in the main by the special master.

Summary Withdrawal of Service Barred

Commission Rules Connecticut Company Must Run Cars in Waterbury Pending Hearing—Fare Increase Gives Good Results

The Connecticut Public Utilities Commission on Nov. 17 directed the Connecticut Company to continue service on its lines in Waterbury pending a public hearing on the transportation situation in that city. The company had previously announced that, because of continued jitney competition, it would withdraw all cars from its Waterbury Division on Wednesday evening. Following the receipt of the commission's order the company rescinded the instructions to its employees to "lay up" the cars at 6 p.m. The commission ruled that the railway must obtain its permission before making a suspension of service, and that permission to discontinue operation could only come after a formal hearing on all phases of the matter.

THE commission, in ruling against the summary withdrawal of service, said:

> It has come to the attention of the Public Utilities Commission, through the public press, that you propose to discontinue street railway service in the city of Waterbury and vicinity today, Wednesday, Nov. 17, 1920.
>
> This commission recently granted a substantial increase in rates applicable to Waterbury and other cities and territories served by your company. The proposed arbitrary suspension, practically without notice to the community, and without any notice to this commission, appears to be unwarranted.
>
> Wherefore, by the virtue of the power vested in this commission you are hereby summarily ordered and directed to refrain from discontinuing public street railway service in Waterbury and vicinity until this commission shall authorize same, after an investigation and hearing had, showing the necessity therefor.

On Nov. 15 President Storrs notified the city authorities of Waterbury that unless steps were immediately taken to bar jitneys from the principal streets containing electric railway tracks, the company would discontinue all service on its Waterbury Division beginning Nov. 17. This action by Mr. Storrs followed the repeal by the Waterbury Board of Aldermen of an ordinance regulating buses within the city limits.

BUS ORDINANCE UNACCEPTABLE

The board on Nov. 15 passed an ordinance forbidding jitneys to run in part over streets followed by electric cars and forbidding them to enter the center of the city, but allowing them to parallel the trolley routes and to operate in part over streets containing railway tracks. The measure as passed by the Board of Aldermen was unacceptable to the Connecticut Company because of its alleged failure to comply with the conditions laid down by Mr. Storrs. The company therefore announced service on the Waterbury lines would be withdrawn Wednesday.

The introduction of a flat 10-cent fare on the company's lines throughout the State of Connecticut has resulted in a considerable increase in the company's revenues. This fact is indicated by officials of the company, who state that during the first two weeks of November the company's passenger receipts were materially larger than under the former zone fare system.

The management also announced the volume of traffic had not been seriously affected by the increase in fare. While some city riders who formerly paid 7 cents have ceased to patronize the trolleys, this loss is more than made up by the fact that many more persons are now using the electric cars in the suburban districts. On outlying lines the 13-cent fare has been reduced to 10 cents, thus holding out an inducement to suburban riders.

GOOD RESULTS FROM NEW FARE

The company is doing everything in its power to improve the quality of its service. It will be some time, however, before the railway can put additional rolling stock in operation. Explaining the situation Charles Cheney, a trustee of the Connecticut Company, said:

> We are doing and have been doing the best we can to better the service, but it must be remembered that for three years there was no chance of a fare increase. The money is now coming in well, but it will take time to make improvements.

The anti-bus ordinance passed last week by the New Haven Board of Aldermen became law on Nov. 16. Mayor Fitzgerald approved the measure with the exception of a clause relating to Temple Street.

No jitneys are now operating in Hartford. The Hartford city authorities recently enacted an ordinance barring buses from the streets. The local association of jitney operators appealed to the Superior Court for an injunction prohibiting the enforcement of this measure, but, as previously stated, the court refused to grant them relief. They have now taken their case to the Connecticut Supreme Court and, pending decision by that tribunal, will refrain from operating their vehicles.

The city of Hartford has protested to the State Public Utilities Commission against its order allowing the Connecticut Company to increase its fare. The commission was scheduled to hold a hearing on this matter at Hartford during the week. A number of citizens of New London have also protested against the raising of the fare in that city.

Court Approves Double Fare

The Appellate Division of the Supreme Court of the First Judicial District of New York has reversed the order of Lewis Nixon, former Public Service Commissioner for the First District, requiring the Brooklyn City Railroad to cease charging two 5-cent fares from the city line to Manhattan.

The effect of the court's decision is to compel many patrons in the more distant zones to pay three fares to go to or from Manhattan by elevated or subway instead of one 5-cent fare as under the former system of free transfers between the surface and the elevated lines of the Brooklyn Rapid Transit Company before its subsidiaries were lopped off as the result of a receivership. In summing up the situation the opinion says:

> The Brooklyn Heights Railroad while operating this (the Flatbush) line was required to give free transfers from the various lines owned or operated by it. It voluntarily fixed a 5-cent fare on this line. These provisions were binding upon it so long as it controlled or operated the line. When, however, the lease terminated, and the owner resumed possession, it took the property with all the rights and subject only to the limitations originally imposed by its franchise which could in no way be limited by any act or obligation of the tenant.
>
> Therefore, we hold that the Brooklyn City Railroad in charging a second fare on that portion of the Flatbush Avenue line beyond the limits of the city line of Brooklyn, as it existed in 1860, is within its legal rights.

Nine-Cent Fare in Cincinnati

Under the terms of the service-at-cost franchise of the Cincinnati (Ohio) Traction Company the present 8-cent fare is to be increased ½ cent. Effective on Dec. 1 the new fare will be 8½ cents by tickets and 9 cents cash.

Figures in the office of W. C. Culkins, Director of Street Railways, show that the accumulated deficit of the company up to Sept. 30, 1920, is $332,758. The franchise provides that should there be a deficit in the cost of operation for two successive months the company must present a financial statement to the Director of Street Railways and give notice of an increase in fares on the 15th of the month following the two months where the losses in operation occurred.

The company's income statement for September follows:

	September	
	1920	1919
Total revenue and income...	$765,798	$672,052
Cost of service:		
(*a*) operating expenses....	559,898	460,487
(*b*) taxes and other deductions..............	274,854	242,818
Balance, deficit............	$68,954	$31,252
Fare, cents..............	8	7 (ticket 6½)
Revenue passengers, number	9,561,608	9,972,289

The decrease in the number of revenue passengers was about 400,000 for the month of September, 1920, as compared with the same month of last year. Under the franchise the company is compelled to make up any deficit which may accrue in the first month of a new quarter from the receipts of the succeeding month, in addition to showing a surplus for the second month.

Officials of the railway express the fear, however, that unless revenue passengers for the next nine months show a decided increase additional advances in fares can hardly be avoided. These increases, in the event of their materialization, would take effect on the first day of March, June and September when the fare would reach 10 cents.

Transportation News Notes

Higher Fare in Greeley.—A 7-cent fare went into effect on the lines of the Greeley & Denver Railroad, Greeley, Col., recently. The fare was formerly 5 cents. The increase was authorized by the State Public Utilities Commission.

Fares Up on Interurban.—Fares on the Rockford & Interurban Railway, Rockford, Ill., between Beloit and Janesville, Wis., were recently raised 20 per cent by authority of the Wisconsin Railroad Commission. The increase in fare amounts to 7 cents between the two cities. The old fare was 35 cents.

Eight Cents Asked in Joliet.—The Aurora, Plainfield & Joliet Railway, Joliet, Ill., has petitioned the Illinois Public Utilities Commission for an 8-cent cash fare. The company asks for permission to sell four tickets for 30 cents or ten for 70 cents. The Evanston Railway, Evanston, has applied to the commission for authority to charge a straight 7-cent fare. The company seeks to discontinue the sale of five tickets for 30 cents as required under the present arrangement.

Approves Reading Increase. — The Pennsylvania Public Service Commission has handed down an order authorizing the Reading Transit & Light Company, Reading, to raise its fare from 7 cents to 8 cents. The company filed a tariff calling for the 8-cent rate some time ago. As a result of protests from the city the company announced that it would suspend the increase pending action by the commission. The new rate took effect on Nov. 8 under authority of the commission's order.

Lower Fares on Suburban Line.—A reduced fare schedule went into effect on the Preston line of the Louisville (Ky.) Railway between the city limits and Camp Zachary Taylor on Nov. 1. Between the city limits and Audubon Park or intermediate points a cash fare of 5 cents instead of 7 cents is now charged. The new plan will give the occasional rider a fare of 10 cents instead of 12 cents and will give to the regular rider a fare of 8 cents by use of special tickets.

Wants More in Rockford.—The Rockford (Ill.) City Traction Company has filed a petition with the Illinois Public Utilities Commission for a 10-cent cash fare with four tickets for 30 cents and twenty school tickets for $1. The matter of increased fare was first taken up with the city officials and discussed, an agreement being reached that the company should petition the commission. The city has asked permission to have the city auditors check the figures presented by the company.

No More "Owl" Cars.—"Owl" service on the lines of the South Covington & Cincinnati Street Railway, Covington, Ky., was discontinued on Nov. 15. The company took action to curtail service because of the refusal of the municipal authorities in Covington, Newport and other cities of northern Ohio to allow the railway to increase its fares. The company contends that it is in need of increased revenue because of a recent advance in the wages of its employees.

Safety Cars in Janesville. — The Janesville (Wis.) Traction Company on Nov. 5 placed five new one-man safety cars in operation and thereby reduced the headway from twenty minutes to twelve minutes. Coincident with this improvement in the service, the Wisconsin Railroad Commission permitted the company to install a fare of 10 cents cash with seven tickets for 50 cents. The increase was granted contingent on the introduction by the company of the twelve-minute headway service.

Must Reduce Bridge Speed.—The transportation department of the Dallas (Tex.) Railway has fixed 8 miles an hour as the speed limit for cars in crossing the Oak Cliff viaduct and the Trinity River bridge. Several minor accidents and derailments recently have brought to the attention of the public and the transportation department the danger of loss of life on these bridges, and a speed limit that insures absolute safely has been fixed and will be rigidly enforced.

Service Improved in Baltimore.—The United Railways & Electric Company, Baltimore, Md., has recently effected some changes in its routing system and has established one entirely new line to better the transportation facilities of the city. The new route, known as the Hudson Street line, will extend from the eastern section to the center of the city. The lines rerouted are the North Avenue, Wolfe Street, Pennsylvania Avenue and Third and Eighth Streets lines.

Speed Limit Fixed.—The City Council of Sioux City, Iowa, has passed an ordinance for the regulation of vehicular traffic in that city. Under the terms of the new law electric cars are classed as vehicles and will be subject to the same restrictions. No car will be allowed to stop in the central district of the city any longer than is necessary to load and unload passengers. No vehicle or electric car shall be operated at a speed to exceed fifteen miles an hour in the business district or to exceed twenty miles an hour in other sections of the city.

Sparks Service Costly.—The Reno (Nev.) Traction Company recently filed a statement with the State Public Service Commission to the effect that for the past eight months operation of its line in Sparks had caused a loss of $1,000 to the company. This action was taken by the company in answer to charges of insufficient and inefficient service. In connection with improving its lines and equipment the Reno Traction Company has retained J. C. Linabary, a railway expert, who will have charge of car operation and maintenance of shops.

Jacksonville Hearings Concluded.—The Florida Railroad Commission has concluded hearings on the application of the Jacksonville Traction Company, Jacksonville, for an increase in fare. The company, in applying to the commission for financial relief, did not specify the amount of the increase desired, but intimated that a 10-cent fare would be needed. G. V. Ramsey, a civil engineer, who made a survey of the company's property, testified that the value of the system for 1920, amounted to $8,074,145. He placed a service appraisement on the property for 1914 of $3,628,454.

Fare Hearing Postponed.—Consideration on the matter of an increased fare by the Manhattan & Queens Traction Corporation, New York, N. Y., has been deferred for two weeks. During that time engineers instructed by Public Service Commissioner Barrett for the First District will make an investigation of the roadbed and the actual conditions of the rolling stock. The company recently informed the commission that unless immediate action were taken the road would have to shut down. The company's deficit has been increasing and it is contended therefore that an increase in the rate of fare is imperative.

Through Freight Service Soon.—The Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., has announced that through freight service is to be started immediately between Indianapolis and all Ohio points reached by interurban via Richmond, Ind., and Dayton, Ohio. The new service of the T. H., I. & E. company will include solid cars for Dayton, Ohio, leaving Indianapolis in the morning and assuring delivery the following day. It also includes direct transfer at Dayton for Springfield, Columbus, Zanesville, Lima, Toledo, Cincinnati and intermediate points. The company has announced to shippers that it can provide cars on short notice.

Eight-Cents in Butte.—The Montana Public Service Commission has granted permission to the Butte (Mont.) Electric Railway to charge an 8-cent cash fare until June 1, 1921. In June of this year the commission allowed the company to raise its cash fare to 8 cents on the condition that tickets would be sold at the rate of 7 cents each. This 8-cent fare expired on Oct. 15 and since then the company has been operating on a 7-cent basis. The commission decided upon the continuance of the 8-cent cash fare after an investigation of the company's statement of earnings, which showed a loss of more than $6,000 during September.

Jitney Ordinance Amended.—At a recent meeting of the City Council of Seattle, Wash., amendments to Ordinance 40,886, dealing with the jitney problem, and under which the Council last spring rejected all applications for jitney permits, causing an appeal to the courts and a restraining order against the city, were introduced by Chairman Oliver T. Erickson of the judiciary committee. A special meeting of the Council will be held shortly to vote on the amendments, which establish a maximum fare of 25 cents on runs after 1 o'clock, and a fare of 15 cents on long runs. Provision is also made for canceling permits for failure to operate, except in case of accident or emergency.

Mayor Asks Better Service.—At a recent meeting of the City Council of Lawrence, Mass., Mayor White stated that he would give the Eastern Massachusetts Street Railway, Boston, one week to improve the service on its Lawrence Division. If action were not taken within that period, said the Mayor, he would call on the city government to make changes in the transportation facilities. Mayor White asked the members of the "home rule" committee, which has been in charge of the affairs of the division for several months, to resign, basing his request on the ground that they had failed to produce results. The Mayor announced his intention of demanding a reduction in the fares in effect on the Lawrence Division.

Railway Checks Reckless Driving—The Dallas (Texas) Railway through its safety and efficiency department has been playing a conspicuous rôle in the safety movement in Dallas. So thoroughly has it engaged in the campaign for checking reckless auto drivers that it has gained the co-operation of several business concerns operating auto trucks. In the case of automobile and auto truck collisions with electric cars the safety and efficiency department of the railway follows up the matter and takes active participation in the discharging or putting on probation of careless drivers who were at fault. Clubs and schools have assisted in this "drive" and it is believed that the railway's efforts have already been rewarded in the noticeable decline in automobile accidents.

Voters Reject Fare Increase.—The voters in Kalamazoo, Mich., at the general election on Nov. 2 rejected the proposal to allow the Michigan Railway to charge a 6-cent fare on its Kalamazoo city lines. A three-fifths majority was needed to carry the proposition. An ordinance providing for the bonding and regulating of jitney buses was repealed by a small majority. Motor buses will now be allowed to operate in Kalamazoo without bonding restrictions. This is the third occasion upon which the Kalamazoo citizens have refused to allow the company an increase in fare. Fares reverted to a basis of 5 cents cash with six tickets for twenty-five cents on Nov. 9. The 6-cent fare had been in effect since September under a temporary agreement between the City Commission and the company as a result of labor difficulties.

New Publications

Wiring for Light and Power,

By Terrell Croft. Published by McGraw-Hill Book Company, New York, N. Y. Flexible cover, 448 pages, illustrated.

This second edition is a thoroughly overhauled and enlarged handbook, containing much new text and many added illustrations. Considerable rearrangement has been necessary due to the extensive changes in the 1918 edition of the National Electrical Code. In its present form it is a valuable handbook for those laying out and installing electrical wiring and apparatus.

Indicators for Carbon Dioxide and Oxygen in Air and Flue Gas

By L. H. Milligan, D. O. Crites and W. S. Wilson. Technical paper 238, United States Bureau of Mines, Washington, D. C.

An excellent gage of efficiency in combustion of fuels is the percentage of carbon dioxide in the flue gas. A simple and accurate instrument for indicating the carbon-dioxide content of air and flue gas, which was designed in the chemical research laboratory of the Bureau of Mines at Pittsburgh, is described in this pamphlet.

Electric Traction and Transmission Engineering

By Samuel Sheldon and Erich Hausmann. Second Edition. 307 pages, illustrated. D. Van Nostrand Company.

In this second edition of "Sheldon and Hausmann" the plan of analyzing and reducing the problems of electric traction to their fundamentals used in the first edition has been followed but the text is based on more recent practice. The problems incident to a complete railway installation are presented and solved and the economics and engineering of transmission lines are also treated. The utility of hyperbolic functions in connection with the solution of transmission-line problems is clearly demonstrated.

The Making, Shaping and Treating of Steel

By J. M. Camp and C. B. Francis. The Carnegie Steel Company, Pittsburgh, Pa. 614 pages. Flexible leather binding.

This book has been written especially for the non-technical employees of the Carnegie Steel Company and others who may desire to secure a general knowledge of the metallurgy of iron and steel. The volume is divided into three parts, which take up successively the making, shaping, constitution, heat treatment and composition of steel. The first chapters are devoted to an elementary treatment of physics and chemistry which lead up to metallurgy. The various processes used in the manufacture of steel are described in considerable detail. Parts which are of particular interest to electric railway employees are those describing the rolling of rails, the Carnegie-Schoen method for manufacturing steel wheels and the forging of axles, shafts and other round shapes. The book is being sold by the Carnegie Steel Company.

Business Finance

By William H. Lough. The Ronald Press Company, New York, N. Y. 631 pages. Cloth.

Mr. Lough has a genius for writing readable books on business subjects. He was formerly professor of finance in New York University, School of Commerce, Accountants and Finance, and is now president of the Business Training Corporation, New York City. This new volume is along somewhat different lines from "Corporation Finance," which established Mr. Lough's reputation as an author. Business Finance is a complete working guide for the financial manager or organizer and a thoroughly practical manual of finance for the business man. It is also very useful for investors. In fact, the volume is designed to prove useful to executive officers, directors and organizers, to bankers, bond dealers and others who must investigate the financial management of enterprises and to engineers, lawyers, accountants and other professional men who are often called upon for financial advice. The subject matter of the book is divided into five parts. 1—Finance and Business. 2—Capital. 3—Securing Capital. 4—Internal Financial Management. 5—Financial Abuses and Involvements.

Traveling Publicity Campaigns

By Mary Swain Routzahn. 151 pages, illustrated. Russell Sage Foundation, New York.

The publicity train, electric car or truck has a number of advantages in the way of conducting an educational or selling campaign within a district. The book mentioned describes two campaigns of this kind conducted by trolley for child welfare and food conservation by women's committees of the Council of National Defence in Massachusetts in 1918 and in the same year in Michigan. The files of this paper have described several other similar campaigns for the education of farmers in improved agricultural methods. In the opinion of the reviewer, the trolley car, in some respects, seems to possess advantages over either of its principal rivals for this service, *i.e.*, the steam railroad train and the truck. As compared with the former, it can travel through the main streets of the city and get the incidental publicity possible thereby and then be sidetracked in an accessible point. As compared with the motor truck, there is less interference from bad weather and more space available for exhibits, lectures, etc. The author has given a number of very suggestive hints on how best to arrange such a tour, advance publicity desirable, arrangement of exhibits in the car, method of receiving visitors, follow-up work, etc. For any organization which intends to conduct a tour of this kind on traveling publicity campaigns the book should be invaluable.

Personal Mention

Director of Ohio Committee Long in Newspaper Field

Benjamin E. Ling, who has been chosen director of the Ohio Committee on Public Utility Information, is a newspaper man of wide experience. He was born in Cleveland and was educated at St. Ignatius College. As soon as he had completed his schooling Mr. Ling entered newspaper work. His first connection was with the Cleveland *Leader*, since merged with the *News*. He did work of a general reportorial nature for that paper for about three years. He then went with the Cleveland *Press*, a Scripps-McRae publication. There he filled about every desk, but steadfastly refused every offer of an inside position. The desire in him for contact with events in the making had become too strong for Mr. Ling to overcome, although he did consent to do semi-editorial news writing. All this time he had devoted himself more particularly to public utility affairs and to politics, until in Cleveland, and in fact all northern Ohio, Mr. Ling had come to be looked upon as probably the best informed newspaper man on utilities in that part of the state. Everywhere in Cleveland keen appreciation is expressed of "Ben" Ling as a fair and impartial observer of events.

When the desirability became apparent of establishing a bureau of information in the interest of the public utilities of the state agreement was unanimous among all the various interests that Mr. Ling was the man best qualified for the job. His paper was loath to lose him, but his superiors readily acknowledged that the new work upon which he was about to enter opened up greater possibilities for Mr. Ling than were offered in newspaper work, particularly as he insisted upon having a part in the making of history rather than being a mere recorder of events. Mr. Ling was in the service of the government at Washington during the war with the rank of Captain. While there he had a large part in the work of preparing "America's Munitions." He is thirty-two years old.

George Carson Joins Washington State Interurban

George Carson has been appointed claim agent of the Seattle & Rainier Valley Railway, Seattle, Wash. Mr. Carson will continue to serve as manager of the Pacific Investigation, Adjustment & Lawyers' Service Bureau, which he recently organized. He was formerly claim agent of the Fifth Avenue Coach Company, New York City. At one time he served as claim agent of the Puget Sound Traction, Light & Power Company. He is a former president of the Pacific Claim Agents' Association and of the American Electric Railway Claims Association. He removed to Seattle about two months ago.

J. A. Perry Elected

Georgian Chosen President of the National Association of Railway and Utilities Commissioners

J. A. PERRY

In selecting James A. Perry for its president for the coming year the National Association of Railway and Utilities Commissioners has chosen a man who has proved that he will exert himself to the utmost to strengthen the prestige of the state regulatory bodies. Mr. Perry is a stanch supporter of the rights of the state commissions. He strongly opposes any curtailment of their powers at the hands either of the Federal Government or of municipalities. He has long been active in the work of the association and prior to his election as president occupied the office of first vice-president.

Mr. Perry has for ten years past been a member of the Railroad Commission of Georgia. He has done much to build up its organization and to place its work on a basis of efficiency. As a member of the commission he has had a voice in deciding many important questions affecting the utilities of the State. The commission recently completed an exhaustive study of the affairs of its Georgia Railway & Power Company, Atlanta, and as a result of its investigation granted the company a substantial increase in rates, including an advance in cash fares on its Atlanta lines to 7 cents.

Mr. Perry was born in Gwinnett County, Georgia, on Jan. 11, 1875. He obtained his early education in the rural schools of that county and was graduated from the Law School of the University of Georgia in 1898. Two years thereafter he was elected Mayor of Lawrenceville, Ga., and later in the same year was elected to the State Legislature. In addition to his public duties Mr. Perry has conducted a law practice in Lawrenceville. He is now president and treasurer of a large industrial enterprise in Lawrenceville.

Richard J. Higgins, general counsel for the Kansas City Railways, Kansas City, Mo., presented his resignation on Nov. 6 to Judge Kimbrough Stone, before whom the recent receivership proceedings were filed. Mr. Higgins has become associated with a Chicago law firm, and will represent E. F. Swinney and the Continental & Commercial Trust & Savings Bank, Chicago, trustees for $28,000,000 of the bonds of the Kansas City Railways.

Obituary

H. C. King, president of the Mason Safety Tread Company, Boston, Mass., died on Oct. 28. Mr. King had been president of the company since 1912. Prior to that time he served as its treasurer.

Augustine S. Cooley, formerly president and treasurer of the Canandaigua (N. Y.) Street Railway, now the Ontario Light & Traction Company, died at his home in Canandaigua on Nov. 9. Mr. Cooley was born in Canandaigua sixty-four years ago.

Arthur E. Hauck, president of the Hauck Manufacturing Company, Brooklyn (N. Y.), manufacturers of oil-burning appliances, furnaces and forges, died in Brooklyn on Oct. 30, aged forty-one years. One of his principal patents is the method of vaporizing kerosene in a torch with proportioned heat-resisting nozzle, the form of vaporization reducing carbonization. Another is the method of atomization through proportioned pipes and openings and with composition nozzle.

Arthur M. Waitt, consulting engineer and railroad specialist, died on Nov. 10 at his home in Sharon, Conn., from the after effects of an operation performed several months ago. Mr. Waitt was a member of the commission which planned the electrification of sections of the New York Central & Hudson River Railroad. He was born in Boston in 1858, a descendant of Governor Hinkley of the Plymouth Colony. After graduating in 1879 from the Massachusetts Institute of Technology he spent many years with various railroads. While with the New York Central he was superintendent of motive power and rolling stock. In 1902 he was elected president of the American Railway Master Mechanics' Association. As a member of the Connecticut Assembly he wrote the automobile laws of that state.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER.
SALESMAN AND PURCHASING AGENT
ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Commission Discontinues Data on Coal Costs

Too Few Operators Report Voluntarily —Test Case Pending Will Decide Authority to Require Data

Since as now handled the monthly reports of the Federal Trade Commission on mine costs of coal are more expensive than they are worth, in the opinion of the commission, they have been discontinued. During the war the reporting of coal costs and sales realization by operators was required as an aid to fixing prices by the Fuel Administration. When the coal operators were released from Fuel Administration control, early in 1920, there was a desire to be free from all federal restriction.

Accordingly, the National Coal Association brought a "friendly" test suit against the Federal Trade Commission in the Maynard Coal Company case before the Supreme Court of the District of Columbia early in 1920. As a result an injunction was served prohibiting further requirement of reports from coal operators by the commission. The latter then requested voluntary reports from operators, to which request a good response was at first received.

The number of operators furnishing data gradually dwindled to about 550 on the June report, however, too small a number to furnish representative figures. This lack of co-operation by the mines was partly due to fear of their reports being used as a basis for possible future price fixing or control by Congress and partly to natural apathy in keeping the necessary cost records. Despite this, a considerable number of operators still favor the continuance of the commission's reports. The latter, in view of the great cost and reduced value of its monthly statistics, however, decided to discontinue their issuance until a decision is reached in the Maynard Coal Company case. In the event of a decision upholding the commission's authority to require reports on coal costs, it is stated, the work will be resumed later.

Good Deliveries of Metal Safety Treads

Orders from Electric Railways Not Extra Heavy, but Demand Is Large —Raw Material Is Plentiful

Demand on the part of traction companies for safety metal treads, while fair, is apparently not extra heavy. One manufacturer, though reporting a recent large order for shipment to California, and smaller ones for central and western states as well as two or three for New England, says that the demand for step treads for electric cars is rather below normal. On the contrary, it is stated the call for treads for steam railroad cars is fully sustained and on the increase. Another company states that orders for street cars are placed only as needed, in small lots from time to time, except where an occasional purchase for new equipment is made, as electric railways do not lay in a large stock of treads for replacements.

The demand for anti-slip treads for general purposes has been gradually increasing and today it is heavy, according to a representative producer. This company's plant is being constantly increased and at present, it is understood, is capable of turning out 60,000 lb. of this one product daily. Another important manufacturer reports that sales to electric railways constitute a comparatively small percentage of the business, as orders for general building and repair work are far beyond what is customary at this season.

Stocks of raw material are said to be ample for all needs, but in some instances no stocks of the finished product are maintained, as orders usually specify certain shapes and sizes. Because of the large factory stocks of steel that are kept on hand, as well as the long-term contracts that in some cases protect the supply of raw material, several manufacturers state that they have passed through the period of advancing steel prices without making substantial price increases and that therefore no fluctuation is expected for some time. The labor situation has eased up materially both as to supply and the attitude of workers. No trouble is experienced in filling any vacancies that occur.

Deliveries in general, it is claimed, can be made as fast as traction companies require the material. Where fabricated stock can be supplied orders can generally be filled immediately from distribution centers. On specification orders, however, shipments are made in from one to four weeks, depending on the size of order.

Factors Governing the Future of Railway Equipment Prices

Because of Lack of Quantity Production Principal Recession Must Come from Greater Efficiency in Management and Labor—Reductions Must Be Gradual

No question is of more absorbing interest to buyers today than that of price trends. Of course prices are coming down, but when? There is no categorical answer, but it is possible to analyze the governing economic conditions. This has been done for the ELECTRIC RAILWAY JOURNAL by a prominent sales representative of one of the well-known electric manufacturing companies, who says that "it's a good bet to gamble on that prices are coming down, but it's a decided risk to say at what rate the reductions will be and at what level they will reach six months or a year hence.

"The people," he continued, "want lower prices and have wanted them for some time, but prices have been very slow in responding. The economic forces that have been working to keep prices up are, among other things, cost of labor, expansion of credit, taxes and, in general, greater demand than supply, the latter, of course, resulting in excess profits on some commodities. While all of these causes and effects may be read by the railway operators and manufacturers and understood by some of them, both are face to face with the same cold fact that cost of operation and of manufacture does not indicate any appreciable weakening.

"Reductions in labor costs that appear possible, and they will be very gradual, are those reductions that will accompany increased efficiency of labor. As a guess, these may be reflected in a 2 per cent to 5 per cent reduction in prices during the next six months.

"Reductions in prices of raw material are much more difficult to deal with —some have come down, some have gone up and others have stood level during the past few months. However, aside from those special cases where stocks had to be converted into cash it is fair to assume that the principal reductions, if any, that occur in raw material will also be those which accompany greater efficiency of labor.

"Many of us overlook the fact in considering 'labor' and 'material' costs that the principal factor in 'material costs' is also labor, hence reductions in material costs must, of necessity, be those which are brought about by greater efficiency of labor or a reduction in labor rates.

"On account of the limited supply and an abnormal demand in some industries there have undoubtedly been some abnormal prices. A lessening of the demand will and has brought such prices down. On the other hand, many broad-minded business men realize that an immediate general reduction of 10 per cent to 15 per cent on all machinery prices would be nothing short of a calamity for the country.

"It is pretty well known that at the present time a vast number of manufacturers of standard supplies and machinery have about all of their assets in their inventories. A shrinkage in value of 10 per cent to 15 per cent would spell bankruptcy for a great majority of them. A condition of this kind would simply mean another panic. It seems therefore that notwithstanding the desire of every one to see prices come down buyers must be patient, for it will be some considerable time before any considerably lower levels are reached on standard supplies and machinery.

"There will, of course, be instances of appreciable reductions in this and that line for some time due to such things as:

"1. Demand dropping off, causing stocks to be put on the market in order to secure cash urgently required.

"2. Demand dropping off, resulting in reduced prices and reduced profits with no reduction in costs.

"3. An effort to encourage buying so as to avoid shutting down.

"Materials and machinery used principally by electric railways are of the standard or specialties class and none of the manufacturers serving them, with one or two possible exceptions, has ever been able to engage in what is commonly referred to as 'quantity production.' In other words, there has been no great 'demand' for supplies or machinery on the part of electric railways for years. Therefore it seems very reasonable to assume that the principal reductions in costs for both the railway operator and the manufacturer are those which, as previously mentioned, accompany greater efficiency in both management and labor."

Should Traction Companies Buy from the Manufacturer or Jobber?

By Scheduling Purchases Several Months Ahead Investment in Stock Can Be Reduced—Field for Larger Co-operation Defined

Every electric railway purchasing agent must decide for himself as to the extent to which he will buy material and supplies direct from manufacturers or through the jobber. Such a decision should be reached, it seems, only after an extended study of the service possibilities of each source of supply, the relation between seasonal and emergency demands, the cost of getting materials, and the possibilities of saving money through what might be called the commercial diversity factor. The increased cost of maintaining stocks in repair shops and elsewhere on traction systems justifies thorough examination of the opportunities for utilizing the facilities of the jobber, in order to cut down the total inventory of spare parts and extra material on hand from time to time

As a large buyer, the electric railway of good size is in a position to obtain liberal concessions on price from the manufacturer, or should be. But idle material standing in bins and filling shelves adds to overhead charges so fast that it is a moot question where to draw the line on reserve equipment parts, track and line material, office supplies, power plant merchandise, etc. The feeling is growing in the trade that if a more scientific study should be made by many companies as to the desirable size of their stocks of supplies as related to seasonal and emergency demands from year to year, it would show clear-cut opportunities for scheduling such purchases more accurately and thus offering the electrical supply jobber a chance to be of greater service. At the same time the manufacturer might become better informed as to the demands to be made upon his facilities for months to come, and would thus be enabled to put through orders more economically, bettering his own production load factor and tending toward ultimate lower costs and prices.

ADVANTAGES OF GROUP BUYING

Spasmodic buying of small supplies from scattered manufacturers lacks the precision attainable when such purchases are handled either individually or pooled through the jobber. To buy quality goods at lowest cost is of first importance to the traction company, but through the co-ordination of purchases the size of necessary reserve stocks can certainly be cut down, even granting the jobber his legitimate profit for maintaining the storehouse for one or more operating companies in his territory.

Some of the material required by electric railways is also useful to central stations. It follows that by anticipating and combining orders, both classes of utilities may be served advantageously. Just as interconnection of power plants has reduced the operating cost of stations when judiciously handled, and as it has cut down the amount of idle reserve equipment necessary, the plan of joint purchasing or of centralized material ordering indicated here offers real opportunities for saving in overhead and running costs. Central stations need to conserve capital at this time as never before, and foresight in purchasing supplies of joint usefulness such as poles, cross-arms, moderate voltage insulators, interior wire, fuses, dry cells, lamps for building service and many other items will repay the railway purchasing agent.

Considerable analysis will no doubt be necessary to establish for individual companies the limits of practical economy in buying through jobbing houses and in purchasing direct from manufacturers. But if the needs of the railways are studied more intensively by special salesmen detailed by the larger jobbing houses to acquire a more intimate knowledge of the life and cost of traction supplies (especially in the repair shop and power plant), it is believed that real savings will become possible. The railway companies will purchase virtually as much material in the long run as ever, barring improvements in practice resulting from the detection of inefficiencies in design and application of equipment parts. The manufacturer will also handle larger orders at a time, and the jobber's overhead and running expenses per unit of product handled will decrease. It is the old story of looking far enough ahead to take advantage of the economic benefits of mass production.

Rolling Stock

The Pacific Gas & Electric Company, Sacramento, Cal., recently received from the St. Louis Car Company six new street cars, costing about $36,000. Delivery of the cars, which seat thirty-four passengers, has been expected since last August.

The Pacific Electric Railway, Los Angeles, Cal., announces that a shipment containing nineteen of the new safety cars, announced in the Aug. 21 issue as being purchased by the company, are en route to the shops, where the cars will be assembled for service on suburban lines of the company.

The Springfield (Ill.) Consolidated Railway Company has received the first of the seventeen one-man street cars which it plans to install. Sixteen others are expected to arrive soon, the total cost of the cars, it is stated, being $117,000. The present twelve-minute schedule on the company's lines is expected to be reduced to nine and ten minutes with the operation of the new cars.

The Staten Island Midland Railway, New Brighton, N. Y., which, following its discontinuance of operation, as mentioned in recent issues of this paper, is being taken over by the city of New York, will be ready to resume operation by Dec. 1, it is hoped. Eight of the twenty-eight new safety cars ordered from the J. G. Brill Company about four or five weeks ago, at a cost of $7,050 each, have been delivered and the rest are said to be on the way.

Birmingham (Ala.) Railway, Light & Power Company, mentioned in the Oct. 9 issue as expecting delivery of fifteen new safety cars about the middle of October, will probably place these cars in operation on the Twentieth Street and Avenue B loop lines. Shipment of the first car was made from Cincinnati early this month, it is announced, and daily shipments will be made until the order is completed. Two more cars of the large "260" type were expected to be placed in operation on the North and South Highlands line last week.

Twin City Rapid Transit Company, Minneapolis, Minn., mentioned in the issue of last week as rebuilding cars into trailers, is reconstructing twenty-five of these trail cars to be placed on No. 11 trucks with standard 26-in. wheels. The trailers will be one step lower than formerly and will weigh 24,960 lb., compared with 42,300 lb. for the standard cars. The trailer conductor will manage the rear entrance door, while the front exit will be operated by the conductor of the motor car, the same as in the two-car unit 2,000 previously described.

Track and Roadway

Washington Railway & Electric Company, Washington, D. C.—The Washington Railway & Electric Company is planning to improve its track and roadway next year. The tracks on G Street from Fourth to Eleventh Street, Northwest, will be rebuilt and also the tracks on North Capitol Street from Massachusetts to New York Avenue.

Capital Traction Company, Washington, D. C.—The Capital Traction Company has proposed an extension of its line from N Street to Pennsylvania Avenue to relieve congestion on the Fourteenth Street line; also an extension on L or M Street, south, between Eleventh Street, east, and Seventh Street, west, and on New Jersey Avenue from E Street, south, to L or M Streets, south, to provide additional facilities for Navy Yard employees. The commission will consider these proposals at the next hearing.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The Trenton & Mercer County Traction Corporation has completed its extension into the heart of Trenton Junction, and cars are now running over that division. For many years the traction company was unable to secure a right of way across the tracks of the Philadelphia & Reading Railway at Trenton Junction, and finally a tunnel was built under the railroad tracks at that place.

Muskogee, Okla.—Plans are again under way for the construction of an electric line from Oklahoma City to Muskogee. This plan is referred to on page 1074 of this issue.

Philadelphia (Pa.) Rapid Transit Company. — The double-tracking on Cobbs Creek Parkway from Spruce to Market Street by the Philadelphia Rapid Transit Company has been delayed. Citizens of West Philadelphia have protested on the ground that boulevards that cost millions of dollars should not be used for street cars.

Wellsburg, Bethany & Washington Street Railway, Wellsburg, W. Va.—It is expected that in the near future the Wellsburg and Bethany line will be extended to Washington, Pa., which will develop one of the richest coal fields in the United States. It is reported that the property of this railway will soon be acquired by the West Penn Traction Company.

Power Houses, Shops and Buildings

Paducah (Ky.) Electric Company.—The Paducah Electric Company has installed new generating units in its power house to replace those wrecked by an explosion of a month ago.

Los Angeles (Cal.) Railway.—The Los Angeles Railway is planning to build two new substations which will cost about $100,000. One will be located near Vernon Avenue and Pacific Boulevard and the other on Buchanan Street. They will improve the power conditions in the districts near by.

Pittsburgh (Pa.) Railways. — The United States District Court has approved the improvement plan suggested by the receivers of the Pittsburgh Railways. The program includes the construction of two new carhouses at a cost of $159,000. One carhouse will be erected in Ross township and the other in Carrick, a suburb of Pittsburgh.

Rutland Railway, Light & Power Company, Rutland, Vt. — The Rutland Railway, Light & Power Company has built a new siding for the purpose of handling cars. It was constructed at the expense of the Vermont Milling Products Corporation, which in the starting up of a new factory greatly increased the freight business of the Rutland Railway.

Trade Notes

The Central Railway Signal Company, Chicago, Ill., has filed plans for the construction of a one-story building at a cost of about $23,000 at Hammond, Ind., to replace a structure destroyed by fire.

The Black & Decker Manufacturing Company, Baltimore, Md., advises that its net sales as of Oct. 31, 1920, are 163 per cent of the total net sales of the year 1919. The company expects its net sales for the year to exceed those of the year 1919 by almost 100 per cent.

The Chickasaw Shipbuilding & Car Company, Birmingham, Ala., is adding a pressed steel car works department to its plant which, it is said, will have a daily output of from twenty to twenty-five cars. Nearly $500,000 is being invested in the car plant.

American Di-Electrics, Ltd., New York City, manufacturers and engineers in the field of electrical insulation, announces that James C. Barr, 84 State Street, Boston, Mass., has been appointed railway representative for the New England States, handling the company's line of insulating varnishes and compounds.

The Austin Machinery Corporation, manufacturer of earth-moving and concrete-mixing and handling machines, announces that ten primary district offices and warehouses and upward of fifty subsidiary offices and agencies have been established throughout the United States. A distinctive trademark has also been adopted by the company.

Galena-Signal Oil Company, New York City, is issuing $4,450,000 of 7 per cent convertible debtenture bonds due April 1, 1930, in denominations of $100 and $1,000. The price given is 93.5 and interest, yielding approximately 8 per cent. The consolidated net earnings of the company and constituent companies available for interest and federal taxes, after making allowance for depreciation, for the nine months ended Sept. 30, 1920, were given as $2,302,154, being at an annual rate of about five times the annual interest charges on the total funded debt now outstanding, including this issue.

George H. Walbridge and Lyman P. Hammond have opened an office at 120 Broadway, New York City, and will undertake special executive work in the investigation, organization, reorganization and financing of public utility and industrial corporations for various investment and commercial banking institutions. They have resigned as vice-presidents of Bonbright & Company, Inc., but continue as active officers of the Colorado Power Company, The Arizona Power Company, Pacific Gas & Electric Company of Phoenix and as directors of other public utility and industrial corporations in which Bonbright & Company are interested.

Stanley W. Midgley and J. M. Borrowdale have organized the firm of Midgley & Borrowdale, with offices in the McCormick Building, Chicago, for the purpose of acting as sales representatives in the Middle West for manufacturers of products for electric and steam railways. The firm will handle the products of the Superior Steel Castings Company, the Pneumatic Safety Valve Company, the Henry Giessel Company, manufacturer of sanitary filters and coolers for passenger coaches; the Trumble Waste Manufacturing Company and the Steel Fabricating Company, manufacturer of sectional steel buildings. Mr. Midgley was Western sales manager of the Curtain Supply Company, from 1906 to 1914. Subsequently he became general sales manager of the Acme Supply Company, Chicago, and since January, 1918, he has been connected with the Liberty Steel Products Company. Mr. Borrowdale's activities have been largely in the steam railway field.

New Advertising Literature

Meters.—The Economy Electric Devices Company, Old Colony Bldg., Chicago, recently issued bulletin No. 70, describing the work of the Economy Meter in reducing energy consumption by electric cars.

What About Your New Cars?

G. M.: Yes, this new equipment will go a long way toward getting better public relations, these new cars surely will draw the short riders.

Supt. Transportation: Well, are all the details specified, heaters, headlights, etc.? Oh, yes, how about those hand brakes?

G. M.: I really don't know. Can't we get along with just the air alone?

Supt. Transportation: I doubt it very much. Those hills at either end of the line are bad and during the rush hour those cars will be heavily overloaded.

G. M.: Well, we might as well have them right from the start. What do you suggest?

Supt. Transportation: I recommend Peacock Staffless brakes, because they're what all the older men want, they've used them everywhere they have ever been and they don't get scared and lose their heads. Just a quick application and the car is brought to a dead stop.

G. M.: All right, I know they're O.K. Everyone I know seems to have them.

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THE P. EDWARD WISH SERVICE
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Aluminum cable with core of steel realizes on the lightness and conductivity of the aluminum and the extra high strength of the steel.

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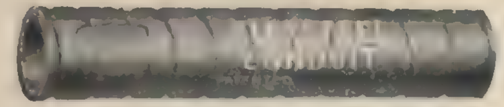

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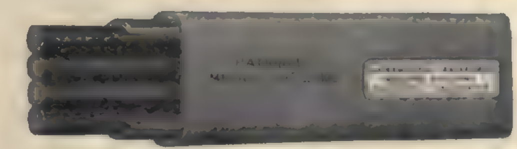
NATIONAL Brackets

LIBERTY Rubber Covered Wire and Cables



NATIONAL METAL MOLDING,
"The Standard for Surface Wiring"

Fixture Stud

Locknuts and Bushings

Outlet Boxes and Covers and Switch Boxes

National Metal Molding Co.

General Offices: Pittsburgh, Pa.

Atlanta
Boston
Chicago
Denver
Detroit

Los Angeles
New York
Philadelphia
Portland
Salt Lake City
San Francisco

Seattle
Buenos Aires
Rio de Janeiro
Sao Paulo, Brazil
Lima, Peru
Santiago, Chile

Medellin, Colombia
Havana
Manila
Mexico City
Shanghai, China

Canadian Distributors: Canadian General Electric Co., Limited.

National Products are sold by Electrical Jobbers in every section of the country.

Announcement

WE beg to announce to our friends, the users of Chillingworth Gear Cases, that our Sales Agents, Messrs. Thayer and Company, Inc., have recently acquired the controlling interest in the Chillingworth Manufacturing Company.

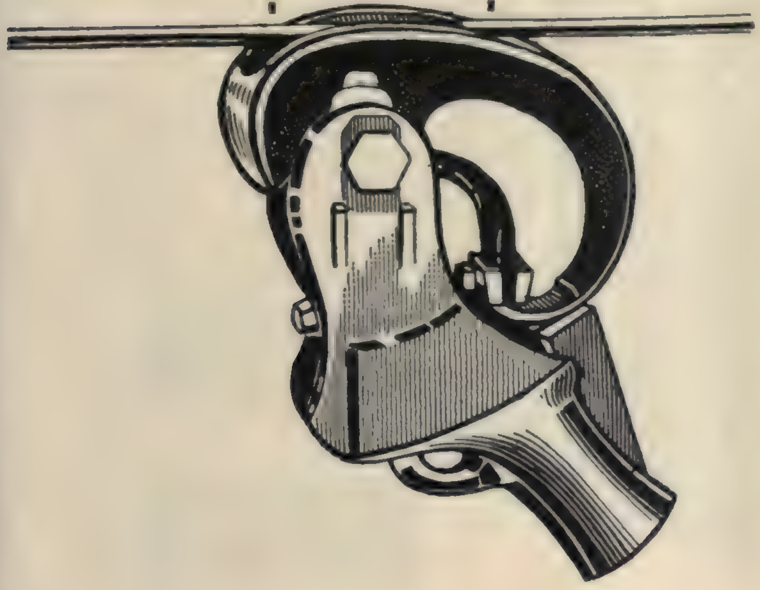
The sales department will continue to be conducted by Messrs. Thayer and Company, Inc., 111 Broadway, New York, and with their added manufacturing interest in the Chillingworth Gear Case, a strong effort will be made for increased service and increased production.

Chillingworth Manufacturing Company

Jersey City, N. J.
November, 1920

The Largest Gear Case Factory in the World
Jersey City, N. J.

←3"→ CONTACT



IN all current collecting devices the more contact you have the less friction exists owing to the tension being distributed over a greater surface.

Miller Trolley Shoe operation proves that the greater the contact surface more power is delivered to the motors, giving greater capacity for overloads.

The Miller Trolley Shoe

has a contact on the wire of 3 inches. This contact is permanent. The Shoe follows each little unevenness in the wire. It does not jump and eliminates all sparking.

Miller Trolley Shoes have solved many problems that were the outcome of low voltage.

We stand ready at all times to show you on your own lines just what an advantage can be obtained by equipping your cars with the Miller Trolley Shoe.

Write Today for Details

Miller Trolley Shoe Co., West Newton, Mass.

SPECIAL REPRESENTATIVE: Holden & White, Inc., Chicago

EASTERN REPRESENTATIVE: National Railway Appliance Co., New York

SALES REPRESENTATIVES:

Alfred Connor
Denver, Colo.

S. I. Wailes
Los Angeles, Calif.

T. C. White & Co
St. Louis, Mo.

F. F. Bodler
San Francisco, Calif.

W. F. McKenney
Portland, Oregon

W. M. McClintock
St. Paul, Minn.

Cut Down Trolley Wheel Maintenance

Rust and gummy wheels and harps will never trouble you provided you specify "Bound Brook" Oil-less Bearings because they have a self-contained lubricant that never gives out.

"Bound Brook" Trolley Wheel Bushings have only one cost—the purchase price. Once installed, they do not need continuous attention, and their longer wearing qualities and smooth-running efficiency reduce their cost-per-mile-of-service to a figure greatly below that of other bushings.

The bushing life ranges from a minimum of 8600 to a maximum of 27,633 miles or more.
Moreover "Bound Brook" Oil-less Trolley Wheel Bushings are now used by two-thirds of America's electric railway systems.

All Genuine Graphited Oil-less Bushings have always been made at Bound Brook, U. S. A.

Bound Brook Oil-less Bearing Co.

Specialists in the manufacture of Oil-less Bushings for more than a third of a century.

Bound Brook, New Jersey
Detroit Office, 1723 Ford Bldg.

"BOUND BROOK"

Trade-Mark Reg. U. S. Pat. Off.

TROLLEY WHEEL BUSHINGS

Khow

The Gurkhas of India rejoice eleven consecutive days on the occasion of the birth of a child.

A name is given and the child is made to khow (swallow) a grain of rice from each friend—which is rough on the child if the family's acquaintance happens to be a large one.

Not half so rough, however, as it is on the man who is saddened for seven times eleven days over the thought of having swallowed a story about being able to eliminate his brush troubles by haphazardly ordering brushes from a large catalog assortment of what-nots.

The Morganite way is best—

How much more scientific to call in a Morgan engineer to study your service and prescribe a type of Morganite brush built *especially* for that service?

You take no chances when *our* chances for future business depend entirely on the success of that prescription and our ability to actually reduce your brush bills.

See for yourself.

Morganite Brush Co., Inc.

Main Office and Factory: 519 West 38th St., New York

DISTRICT ENGINEERS AND AGENTS

Lewis & Roth, 13th and Wood Sts., Philadelphia

Electrical Engineering & Mfg. Co.,
First National Bank Bldg., Pittsburgh

R. W. Lillie Corporation, 176 Federal St.,
Boston, Mass.

W. R. Hendrey Co., Hodge Bldg., Seattle

Herzog Electric & Engineering Co., 150 Steuart St.,
San Francisco

Charles Farnham, I. W. Hellman Bldg.,
Los Angeles

Railway & Power Engineering Corporation, Ltd.,
131 Eastern Ave., Toronto, Ontario, Canada

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

"The 'Standard' Brand on your material is an assurance of eventual economy."

STANDARD STEEL WORKS CO.

GENERAL OFFICES:

500 NORTH BROAD ST., PHILADELPHIA, PA.

CHICAGO
ST. LOUIS
HAVANA, CUBA
ST. PAUL

RICHMOND
SAN FRANCISCO
NEW YORK
HOUSTON

MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

The Reasons Why.

Rolled and Forged Circular Sections

made by our special methods should be specified

Told in Five Chapters

CHAPTER IV

What Happens to the Block

The block, sheared from a bloom rolled from a 22"x22" ingot is placed between the dies of the machine described in last week's advertisement. As a result of the combined pressing and rolling action to which it is subjected, the metal flows outward in a parabolic path till it reaches the edges of the dies and assumes the finished shape. See scale photographs, Nos. 4 to 7, showing changes in shape during this operation.

In chapter II, attention was called to the fact that piping or segregation remained at the center of the block. This also holds true in the present case with the result that any that is present is located in the hub where it is either punched out or is in a position where it can do no harm. The outer and best part of the metal is at the circumference where it should be.

TURBINE BUCKET WHEEL

ROUGH TURNED GEAR BLANK

STREET CAR WHEEL

AUTOMOBILE FLYWHEEL BLANK

SHAFT COUPLING

Uniform Circular Sections

of many kinds can be made by our special methods. A few of these are listed below:

- **Automobile Flywheel Blanks**
- **Car Wheels**
- **Crane Track Wheels**
- **Gear Blanks**
- **Industrial Wheels**
- **Shaft Coupling Blanks**
- **Turbine Discs**

Write for detailed information.
Also watch for next week's advertisement.

Midvale Steel and Ordnance Company
Cambria Steel Company

General Sales Office, Widener Building, Philadelphia, Pa.

District Sales Offices
Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia
Pittsburgh, San Francisco, Salt Lake City, Seattle, St. Louis

Sole Export Representatives
Consolidated Steel Corporation, 165 Broadway, New York
All export inquiries should be sent to this address

40-1

ARMATURE
Babbitt Metal

The cost of Babbitt Metal cannot be determined until after labor, repair and replacement expense have all been considered.

When costs are correctly figured, it will be found that More-Jones Armature Babbitt Metal is by far most economical on the market, because its exceptional quality (the result of 40 years' chemical and metallurgical research) is such that repairs and replacements are reduced to the very minimum.

Write today for complete data on this better Babbitt Metal.

TROLLEY WHEELS—V-K Oilless, M-J Lubricated,
V-K Non-Arcing Harps
CAR JOURNAL BEARINGS—"Tiger" Bronze
Axle and "Tiger" Bronze Armature
Bearings and Armature
Babbitt Metal

MORE-JONES
BRASS & METAL CO.
ST. LOUIS, MISSOURI

Of the 27 Elec Ry Co's
in Ohio
Controlling over 15 Cars each,
19 regularly use
"Tool Steel" gears & pinions
$\frac{19}{27}$ = 71 o/o

watch for your state

Bates One-Piece Steel Poles in Lapland, Sweden

These Expanded Steel Poles are being used by the Royal Swedish State Railways to give permanent construction in Lapland, Sweden—75 miles north of the arctic circle. Climatic conditions are extremely severe in this wind swept arctic solitude. Patroling this line is impossible at times, replacements are prohibitive—the construction just had to be permanent and reliable as well as economical, so Bates Poles were chosen.

The engineers of the Swedish government who made this installation have recommended and specified Bates Poles many times since then and we ship them thousands of poles yearly. This installation demonstrated beyond any doubt that Bates one-piece Steel Poles are dependable, permanent and decidedly economical.

Your construction is permanent when you use Bates one-piece steel poles. Their economical tested strength gives unfailing service.

Our New 1921 TREATISE AND HANDBOOK sent upon request.

Bates Expanded Steel Truss Co.
208 South La Salle Street
CHICAGO, ILLINOIS

A Permanent Investment

Under the present conditions, electric railway operators should see that every investment yields permanent results. Where track is laid on

Steel Cross Ties

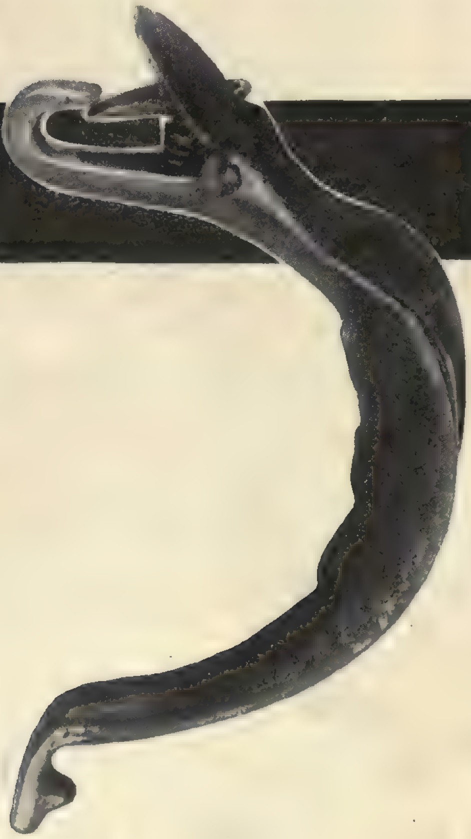
it is not an annual renewal proposition. The track is put down to stay, the smoothest and most permanent track obtainable. The views above show steel ties being laid on St. Clair Avenue, Cleveland, Ohio.

Practical use over a period of fifteen years has established steel cross ties as an effective and efficient substitute for wood. Interesting examples of roadbed construction are contained in the pamphlet—Steel Cross Ties—a copy of which may be obtained from any district office.

Carnegie Steel Company

General Offices: Carnegie Building, Pittsburgh, Pa.

1391



Sleet Cutter

Simple in construction—easy to attach—efficient in operation.

The Sleet Cutter illustrated on this page is made in both malleable iron and brass. It can be readily attached without removing the trolley wheel. It cleanly shears off all accumulations of ice and sleet, leaving a clean, bare wire for the passage of the trolley wheel. It can't injure the wire.

The safety rope-fastening device prevents the cutter from being lost.

Complete data and prices will be mailed upon request. Write today.

The Advance Manufacturing & Tool Co.
Cleveland, Ohio

NO MORE BROKEN WINDOWS

Install EDWARDS Compression Brake Device

as Philadelphia has done on 1,500 of its cars. Chicago, on its new trailer, and many railways on their latest equipment.

In raising the sash the sliding shoe compresses the weaker spring, allowing it to be raised easily and without rattling. In lowering the sash the shoe compresses the heavier spring thus retarding the downward movement of the window.

This device will lower your maintenance costs and prevent damage claims.

Edwards window fixtures are standard on Birney Safety Cars

O. M. EDWARDS CO., INC., SYRACUSE, N. Y.

Manufacturers of:

Window Fixtures
Sash Balances

Top, Bottom and Side
Weather Stripping

Metal Extension Platform
Trap Doors

Metal Stop Casings
Railway Devices

We don't make all the controller fingers used but we make the best—and every year adds to our long list of customers and those who once use triggerlock reversible controller fingers always want them as standard—in the past nine months our sales are fifty per cent more than during the whole of last year, and as the major part of this is to our old friends we are assured that they are obtaining perfect service—

There is a triggerlock finger for every type of controller. Specify them on your next requisition.

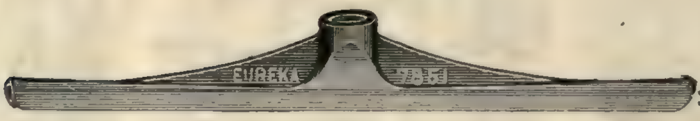
Call on us when at the convention.

G.E.K.-10
Showing
Tip unlocked

This is all you scrap when both sides of tip are worn out.

RUSSELL MANUFACTURING COMPANY

814-18 Bath Ave., Niagara Falls, N. Y.
557 King St., West, Toronto, Canada



Eureka Equipment

is made from our own special alloys. Correct design and careful manufacture are the things we take pride in. Our line includes:

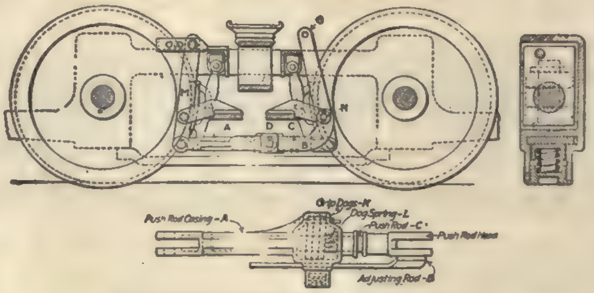
Commutators
Trolley Wheels
Trolley Ears
Brush Holders
Sleet Trolley Wheels
Line Material
Controller Fingers
Bearings

Write for catalog.

The Eureka Company

Northeast, Pennsylvania

The Same Braking Power at all times with GOULD Slack Adjusters



DETAILS OF THE GOULD TYPE SLACK ADJUSTER AS APPLIED TO AN ELECTRIC CAR TRUCK

Their use means SAFETY at all times in braking. A predetermined piston travel is always maintained. And they are economical. All manual adjustment of brakes is done away with, less power consumed in car operation and a great saving in the wear and tear of car equipment is effected.

Gould Slack Adjusters pay for themselves in a very short time.

GOULD COUPLER COMPANY

30 East 42nd Street, New York *Works: Depew, N. Y.* Rookery Bldg., Chicago

Eliminate Brush Chatter

By Specifying

Lindall Brush Holders

No pigtails, no screws to work loose. No troubles, brush is easily removed and inserted.

Avoid all trouble, increase life of commutator by getting the brush with a constant brush pressure.

Albert & J. M. Anderson Mfg. Co.

289-293 A Street **(Established 1877)** **Boston, Mass., U. S. A.**

BRANCHES:

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U.S.G. BRUSHES ~

and the Safety Car

Constant and rapid operation are important factors in the successful operation of the Safety Car.

An all important factor in this connection is MOTOR BRUSHES.

There's a U. S. G. BRUSH for your particular service.

It's self lubricating, non-abrasive, uniform in quality and of very high carrying capacity.

Why not try it?

Send machine ratings and let our engineers select the grades best suited to your own equipment needs.

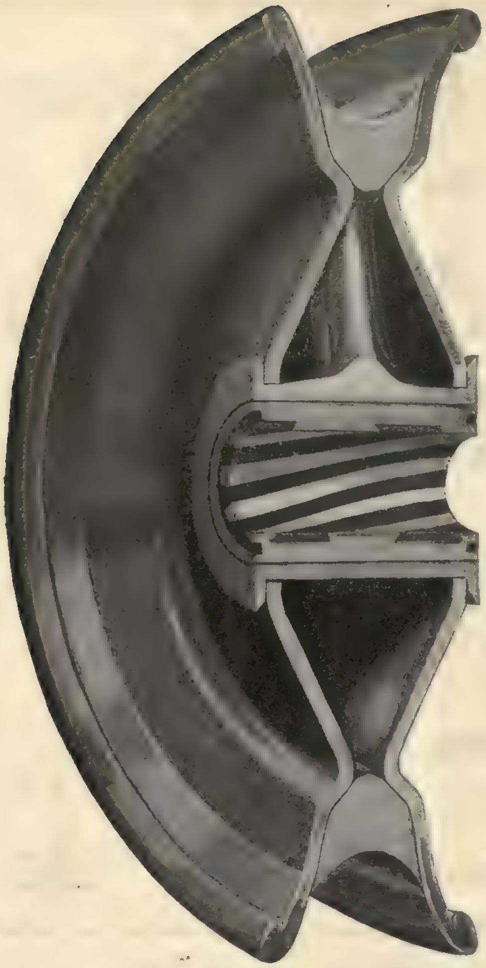
Do it Now—To-day.

The United States Graphite Co.

Saginaw, Michigan, U. S. A.

Branch Offices: New York Philadelphia Pittsburgh Birmingham
Chicago St. Louis Denver San Francisco

LARGEST MINERS OF GRAPHITE ON THIS CONTINENT



Nuttall

*The "Ideal"
Trolley Wheel has Balance
and Lightness*

This illustration needs but little description to supplement all that it shows about balanced construction. However, there is no doubt that the equal-weight halves of the Ideal wheel secured on each side of the balanced bronze center will result in a perfectly balanced, strong, and light weight wheel.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

Griffin Wheel
Company
McCormick Building
Chicago, Ill.

GRIFFIN F. C. S. WHEELS

For Street and Interurban Railways

All of our plants have adequate facilities for fitting wheels to axles

FOUNDRIES:

Chicago
Detroit
Boston
St. Paul
Tacoma
Denver
Kansas City
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Fire caused only slight delay in production.

Already shipping cars.

Send us your inquiries.

ST. LOUIS CAR CO.

"Birthplace of the Safety Car"

Railway Roller Bearings

Increase Schedule Speeds—

Decrease Maintenance Costs

The advent of the safety car demands bearings that will speed up schedules and use less power.

In Rollway Bearings we have reduced friction to a minimum, taken up the end thrust by a specially designed roller bearing assembled on the thrust nut, and inclosed the whole bearing in a dustproof, oil tight cover.

These bearings are readily assembled on any make or size motor and will satisfy all service demands.

The Railway Roller Bearing Co.

Syracuse, N. Y.

MAAG GEARS are best for Electric Railway use

Tried out on the tramways in the mountain districts of Switzerland for a number of years, Maag Gears have met with signal success.

Under the severe conditions of electric railway service where repeated fast acceleration loads are carried on gears and pinions of the driving equipment, it is well to take advantage of gears that are not only stronger than the average but also possess tooth outlines which cut down the noise and wear.

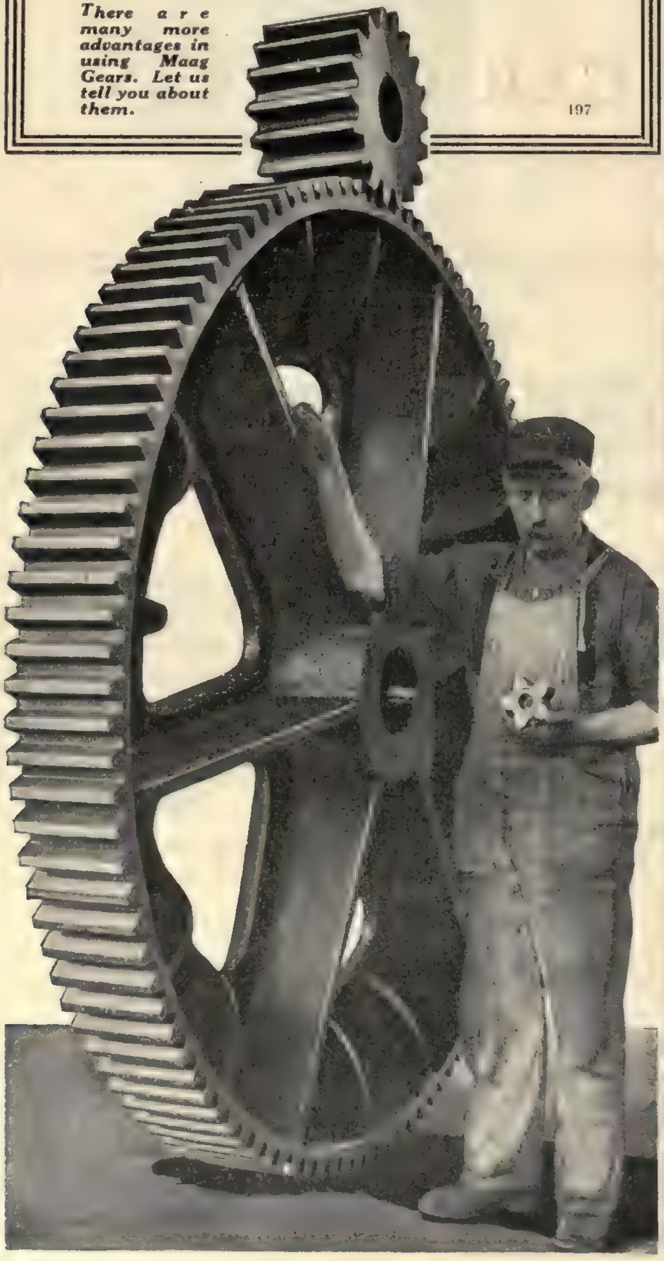
The new development in gear generation,—Maag Gears,—is particularly adaptable to this service. With their true involute outlines, accurately cut, they have stronger teeth than the corresponding ordinary gears. The maximum rolling contact and minimum sliding contact together with the longer active profile of the new design insure quiet operation and long life.

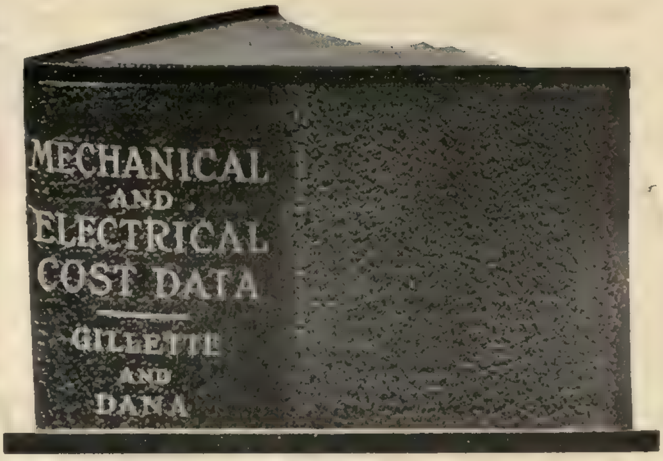
NILES-BEMENT-POND CO.

111 Broadway, New York City

There are many more advantages in using Maag Gears. Let us tell you about them.

197





MORE TIME for work that counts

Every electrical railway engineer whose estimating and appraising problems consume extra time and effort needs this book.

It enables the practising engineer, designer and superintendent to give additional attention to productive work—*work that counts.*

Not merely a book—it is an everready aid that increases the results of the technical man's working day.

MECHANICAL AND ELECTRICAL COST DATA

By H. P. Gillette and R. T. Dana

1734 *pages,* 4½ *x* 7, $6.00 *net, postpaid.*

The data in this book consist of actual figures taken from the records of successful engineers. Every detail is carefully itemized and analyzed and so presented as to permit its ready application to your cost finding problems.

The net prices, shipping weights and output of machines and appliances of many types, classes and sizes are given together with installation costs. Reliable information is also included relating to operating expenses, depreciation and other fixed charges, as well as the first cost of a wide variety of plants and plant units.

This data used as a check against your figures will remove the element of risk when making estimates and appraisals. As a time-saver the book is indispensable.

Examine the book for 10 days FREE

FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc.,
239 West 39th Street, New York, N. Y.

You may send me on 10 days' approval.

Gillette and Dana's Mechanical and Electrical Cost Data, $6.00.

I agree to pay for the book or return it postpaid within 10 days of receipt.

Regular subscriber to the Elec. Ry. Journal?........

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(Books sent on approval to retail customers in the U. S. and Canada only.) E 11-20-20

Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000, Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.
Est. 1848—Inc. 1870

STANDARD Products

Copper, Brass, Bronze Rods, Wires
Copper and Brass Tubes
Colonial Copper Clad Steel Wire
Weatherproof and Magnet Wire
Rubber Insulated Wire
Lead Covered and Armored Cables
Cable Terminals, Junction Boxes, etc.

A SPECIALIZED experience of over 38 years in the manufacture of electric wires and cables is the guarantee back of STANDARD products.

During this period they established a reputation for exceptional dependability, and to-day, among many large and discriminating buyers, they are recognized as standard in quality as well as in name.

We will gladly refer you to some of these satisfied customers.

Standard Underground Cable Co.
Pittsburgh, Pa.

Boston, New York, Philadelphia, Pittsburgh, Chicago, Detroit, St. Louis, San Francisco

1870-EUGENE F. PHILLIPS. AMERICAN ELECTRICAL WORKS-1882.

WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
(Single, Duplex and Three Phase)
TROLLEY WIRE
(Round, Grooved or Figure 8)
BARE COPPER WIRES AND CABLES
MAGNET WIRE
(Cotton or Asbestos)

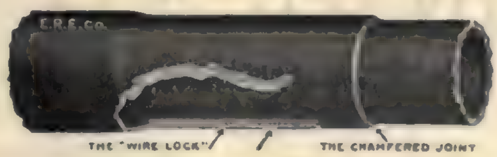
Americanite Rubber Covered Wire
Incandescent Lamp Cord

Galvanized Iron and Steel Wire and Strand

AMERICAN ELECTRICAL WORKS
Phillipsdale, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way; San Francisco, 612 Howard; Seattle, 100 1st Ave. So.

ELRECO TUBULAR POLES

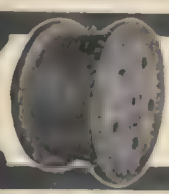


COMBINE

Lowest Cost
Least Maintenance
Lightest Weight
Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street



ANACONDA
Copper Wire
111 W. Washington St., Chicago

COPPER CLAD STEEL COMPANY

COPPERWELD

OFFICE AND WORKS
RANKIN, PA. BRADDOCK P O

WESTERN SALES REPRESENTATIVES
STEEL SALES CORPORATION, CHICAGO, ILL

NEW YORK SALES OFFICE 30 CHURCH STREET, NEW YORK CITY

"Copperweld"—a copper conductor with the strength of steel. Cheaper, stronger, better than copper wire.

FIR **LUMBER** FIR

TIES—TIMBERS—POLES—PILING
DUNCAN LUMBER COMPANY, Portland, Oregon

Specialists
in
Street
Railway
Requirements
Write for List

TRUCK WITH TOWER IN RUNNING POSITION

This 3-Section

TRENTON TOWER

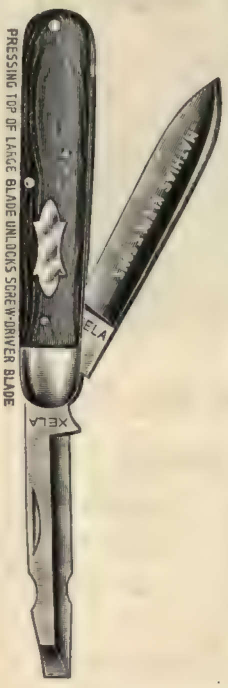
is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.
Trenton, New Jersey, U. S. A.

USEFUL
ELECTRICIANS' KNIFE


PRESSING TOP OF LARGE BLADE UNLOCKS SCREW-DRIVER BLADE
ELA
XELA

A handy combination for the electrician, combining an emergency screw driver, a knife blade for cutting or stripping wire; locked so that it cannot close during use. The commendable features are a well-tempered blade, a strong joint, a solid well-proportioned hand-fitting handle and a lock to keep the blade securely open, yet promptly releasable when it is desired to close the blades. Screw driver blade is locked when open; to unlock, press down on large blade.

Mathias Klein & Sons
Canal Station 25, Chicago

INSULATING MATERIAL

T. C. WHITE ELECTRICAL SUPPLY CO.
1122 Pine Street, St. Louis, Missouri

"A Dependable Source of Supply"

Cotton Tape and Sleeving—Oiled Muslin and Tapes—Fibre—Sheets, Rods and Tubes—Friction and Rubber Tapes—Mica—Cut, Uncut and Band—Mica Plates, Rings, Segments—Fish Paper, Red Rope Paper, Press Board, Insulating Varnishes.

Write for Catalog

Peirce Forged Steel Pins
with Drawn Separable Thimbles
Your best insurance against insulator breakage
Hubbard & Company
PITTSBURGH, PA.

Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG.
ARCHBOLD-BRADY CO.
Engineers & Contractors **SYRACUSE, N. Y.**

Trolley Wire

INSULATED WIRES AND CABLES
WELDING WIRE WIRE STRAND
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

Chapman
Automatic Signals
Charles N. Wood Co., Boston

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDERED
TRIPLEX

Send for new Rail Bond book

American Steel & Wire Company
CHICAGO
NEW YORK

Good culverts for winter

"A railway is as safe as its culverts"—for it is possible that a wreck would result from a culvert breaking down. During the winter months especially is a culvert subjected to severe conditions. Then is the time when

"ACME" (NESTABLE) Anti-Corrosive Galvanized Corrugated CULVERTS

show their true worth. For no matter how low the temperature goes or how suddenly a thaw takes place, "ACMES" are not affected. Due to their sectional construction they readily adjust themselves to suit conditions.

Consider the fact that 165 Steam and Electric Railways now use "ACMES." Could there be any stronger evidence of their dependability? Write for catalog M-21.

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

ERICO Portable Welding Apparatus the Ideal Maintenance Systems

Wherever wear or injury may appear, this convenient portable apparatus may be operated. Adaptable to track or shop welding and rail bonding. *Send for Bulletins.*

Electric Railway Improvement Co.
Cleveland, Ohio

FOR EVERY NEED

No. 1. Flat wire, to sweep crossings.
No. 2. Split Bamboo for switches, frogs, etc., to remove snow and light dirt.
No. 3. Flat wire for slush, mud and dirt on curves and in switches. A chisel point on the end of the handle loosens ice and may be used to throw switches.

The finest materials obtainable make Paxson brooms the best upon the market.

Write for prices.

J. W. PAXSON CO., Mfrs.
1021 N. Delaware Ave., Philadelphia, Pa.

SPECIAL
TRACK WORK

For Electric and Steam Railroads, in all types of construction
Converter and Electric Steel Castings
Hammer and Press Forgings
Seamless Steel Gas Cylinders

WM. WHARTON
JR. & CO. INCORP.
EASTON, PA.
Subsidiary of Taylor-Wharton Iron & Steel Co.
High Bridge, N. J.
OTHER PLANTS:
Philadelphia Roll & Machine Co., Philadelphia.
Tioga Steel & Iron Co., Philadelphia.

ORIGINATORS OF
MANGANESE STEEL
TRACK WORK

HIGH-GRADE TRACK WORK
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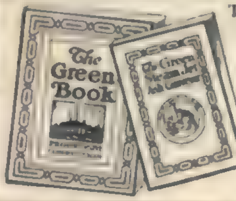
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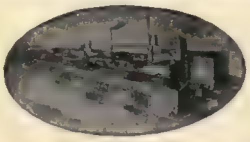

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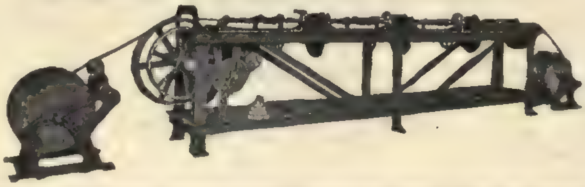

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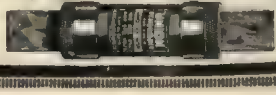

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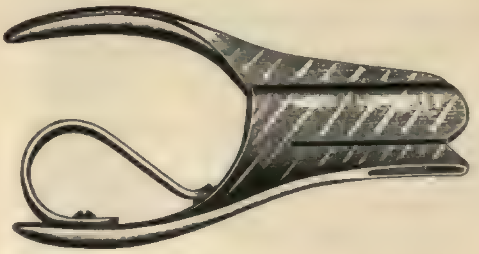

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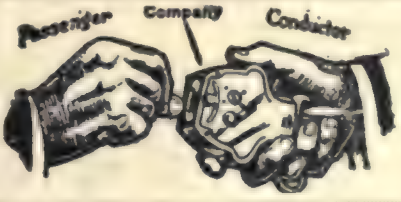

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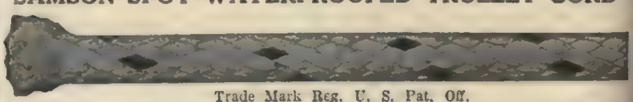

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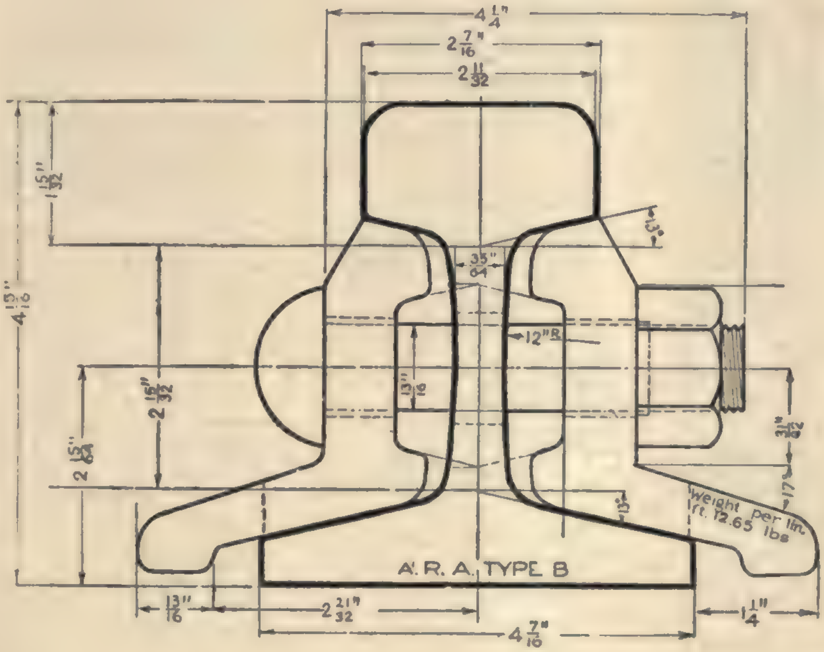

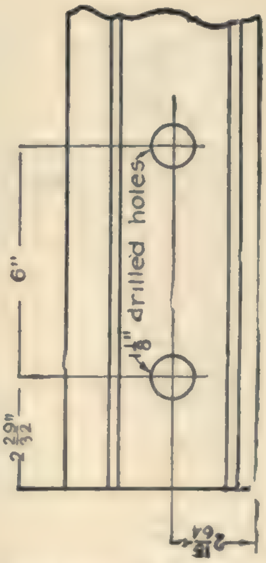

Note actual dimensions of rail stated hereon.

HYMAN-MICHAELS COMPANY

NEW AND RELAYING RAILS

Peoples Gas Building, Chicago, Ill.

New York Office
1324-1326 Woolworth Building

Pittsburgh Office
1312 First National Bank Building

St. Louis Office
2115 Railway Exchange Building

We buy electric and steam railways that are to be dismantled

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Ammeters
Weston Electrical Instrument Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Track Specialties Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Ash Storage Tanks, Cast Iron
Green Engineering Company

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Cambria Steel Co.
Midvale Steel & Ordnance Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Babbitt Metal
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
American Railway Supply Co.
Electric Service Supplies Co.
International Register Co., The

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
Post & Co., Inc., E. L.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bearings, Roller and Ball
Gurney Ball Bearing Co.
Railway Roller Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement Pond Co.
Track Specialties Co.

Boilers
Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & Mfg. Co.

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Bores—Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Smith-Ward Brake Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

Bricks, Fire
Green Engineering Co.

Brooms, Track, Steel or Rattan
Paxson Co., J. W.
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Morganite Brush Co.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
National Metal Molding Co.

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Carbon Brushes. (See Brushes, Carbon

Car Heaters
Economy Electric Devices Co.

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Midvale Steel & Ordnance Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Earll, Chas. I.
Electric Service Supplies Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.

Checks, Employees
American Railway Supply Co.

Circuit Breakers
Cutter Electrical & Mfg. Co., The
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Combustion Systems
Engineer Co., The

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Mica Insulator Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Concrete Products
Massey Concrete Products Corp.

Condensers
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.

Conduits, Flexible
Tubular Woven Fabric Co.

Conduits, Interior
National Metal Molding Co.

Connectors, Solderless
Frankel Connector Co.
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
Portable Machinery Co.

Conveyors, Coal and Ash
Green Eng. Co.
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Green Eng. Co.
Portable Machinery Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works
Trolley Supply Co.

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Cranes
Niles-Bement-Pond Co.

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing)

Crossings, Frog & Switch
Wharton, Jr., & Co., Wm.

Crossings, Track. (See Track, Special Work)

Culvert Pipe, Concrete
Massey Concrete Products Corp.

Culverts
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Du Pont Fabrikoid Co.
Edwards Co., Inc., The O. M.
Electric Service Supplies Co.
St. Louis Car Co.

Cutouts
Chicago Fuse Mfg. Co.

Dealers' Machinery
Archer & Baldwin
Electric Equipment Co.
Foster Co., L. B.
Hyman Michaels Co.

Derailing Devices. (See also Track Work)
Cleveland Frog & Crossing Co.
Wharton, Jr., & Co., Wm.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G
Edwards Co., Inc., The O. M.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging. (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Drinking Cups, Sanitary Paper
Individual Drinking Cup Co., Inc.

Dryers, Sand
Electric Service Supplies Co
Zelnicker Supply Co., Inc., Walter A.

Electrical Wires and Cables
Roebling's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Byllesby Engineering & Management Corp.
Clark Management Corp., E. W
Drum & Co., A. L.
Engel & Hevenor
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells

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A. C. and D. C. Voltmeter

One of the Portable Electrodynamometer Group, which also includes Model 310 Single Phase and D.C. Wattmeter, Model 329 Polyphase Wattmeter, and Model 370 A.C. and D.C. Ammeter.

The characterstics of the group are extreme accuracy (guaranteed within one-fourth of 1% of full scale value), adaptability for use on circuits of any commercial frequency and any wave form, great overload capacity, low moment of inertia, effective damping and shielding and the legibility and remarkable uniformity of the hand-calibrated scales.

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For Safety Cars

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If you want competent and efficient assistants, experienced in the field served by this journal, you will naturally find such men among our readers—which include the keenest and most progressive men in the industry.

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50 East 42nd St., NEW YORK CITY
Hegeman-Castle Corporation, McCormick Bldg., Chicago, Ill.
National Railway Appliance Co., Munsey Bldg., Washington, D. C.
National Railway Appliance Co., Little Bldg., Boston, Mass.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions, Anderson Slack Adjusters, Genesco Paint Oils, Clapp's Fire Resisting Paint, Dunham Hopper Door Device, Feasible Drop Brake Staffs, Anglo-American Varnishes, Paints, Enamels, Surfaces, Shop Cleaner, Johnson Fare Boxes, Drew Line Material and Railway Specialties, Perry Side Bearings, Miller Trolley Shoes, Hartman Centering Center Plates, Economy Power Saving Meters, H. and W. Electric Heaters, Garland Ventilators, Pitt Sanders, National Safety Car Equipment Co.'s One-Man Safety Cars, Flaxlinum Insulation.

Holst, Englehardt W.
Jackson, Walter.
Jacobs & Co., J. L.
Kelly, Cooke & Co.
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Scofield Engineering Co.
Stone & Webster
White Engineering Corp., The J.G.

Engines, Gas, Oil or Steam
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Fare Boxes
Brill Co., The J. G.
Cleveland Fare Box Co.
Economy Electric Devices Co.
Johnson Fare Box Co.
National Railway Appliance Co.

Feed Water Heaters
Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Star Brass Works

Fibre and Fibre Tubing
Continental Fibre Co.
Westinghouse Elec. & Mfg. Co.

Field Coils. (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Flaxlinum Insulation
National Railway Appliance Co.

Floodlights
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track. (See Track Work)

Funnel Castings
Wharton, Jr., Inc., & Co., Wm.

Fuses and Fuse Boxes
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.

Gages, Oil and Water
Ohio Brass Co.

Gaskets
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Carnegie Steel Co.
Standard Steel Works Co.

Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Thayer & Co., Inc.
Westinghouse Elec. & Mfg. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
General Electric Co
Westinghouse Elec. & Mfg. Co.

Gongs. (See Bells and Gongs)

Graphite
Morganite Brush Co.

Grates, Chain
Green Eng. Co.

Greases. (See Lubricants)

Grinders and Grinding Supplies
Metal & Thermit Corp.
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
More-Jones B. & M. Co.
Nuttall Co., R. D.
Star Brass Works

WHAT AND WHERE TO BUY

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford-Chain Block Co.
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., The

Hose
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Houses, Watchman
Massey Concrete Products Corp.

Hydraulic Machinery
Niles-Bement-Pond Co.

Injectors
Schutte & Koerting Co.

Inspection
Electrical Testing Lab's

Instruments, Measuring, Testing and Recording
Economy Elcetric Devices Co.
General Electric Co.
Thompson-Levering Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec. Instrument Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Mica Insulator Co.
Sherwin-Williams Co.
Standard Underground Cable Co.
Westinghouse Elec. & Mfg. Co.

Insulation. (See also Paints)
Anderson M. Co., A. & J. M.
Dolph Co., J. C.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Mitchell-Rand Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Insulators. (See also Line Material)
Anderson M. Co., A. & J. M.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Insulator Pins
Electric Service Supplies Co.
Hubbard & Co.

Jacks. (See also Cranes, Hoists and Lifts)
Brill Co., The J. G.
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.

Joints, Rail
Carnegie Steel Co.
Rail Joint Co.
Track Specialties Co.
Zelnicker Supply Company, Inc., Walter A.

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
Railway Roller Bearing Co.

Junction Boxes
Standard' Underground Cable Co.

Lamp Guards and Fixtures
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
National Electric Specialty Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent. (See also Headlights)
Anderson M. Co., A. & J. M.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
Ohio Brass Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
McCabe Lathe & Machinery Corp., J. J.
Niles-Bement-Pond Co.

Lightning Protection
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Loaders, Wagon, Truck or Car
Portable Machinery Co.

Locking Spring Boxes
Wharton, Jr., & Co., Wm.

Locomotives, Electric
Brill Co., The J. G.
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Lubricating Engineers
Galena-Signal Oil Co.
Texas Co.

Lubricants, Oil and Grease
Galena-Signal Oil Co.
Texas Co.

Machine Tools
Columbia M. W. & M. I. Co.
Niles-Bement-Pond Co.

Machine Work
Columbia M. W. & M. I. Co.

Machinery, Insulating
American Insulating Machine Co.

Magnet Wire
Belden Mfg. Co.

Manganese Steel Castings
Wharton, Jr., & Co., Wm.

Manganese Steel Special Track Work
Wharton, Jr., & Co., Wm.

Meters, Car, Watt-Hour
Economy Electric Devices Co.

Meters (See Instruments)
Electric Service Supplies Co.

Mica
Mica Insulator Co.

Mirrors for Motormen
Drew Elec. & Mfg. Co.

Molded Insulation and Parts
Belden Mfg. Co.

Motormen's Seats
Electric Service Supplies Co.
Wood Co., Chas. N.

Motors, Electric
Westinghouse Elec. & Mfg. Co.

Motors and Generators, Sets
General Electric Co.

Molding, Metal
National Metal Molding Co.

Nuts and Bolts
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.

Ohmmeters
Weston Elec'l Instrument Co.

Oils. (See Lubricants)

Oil Burning Equipment
Schutte & Koerting Co.

Oxy-Acetylene (See Cutting Apparatus Oxy.)

Packing
Post & Co., Inc., E. L.
Westinghouse Elec. & Mfg. Co.

Paints & Varnishes (Preservative)
St. Louis Surfacer & Paint Co.
Sherwin-Williams Co.

Paints and Varnishes (Insulating)
American Di-Electrics, Ltd.
Dolph Co., John C.
Mitchell-Rand Mfg. Co.
Sherwin-Williams Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.
Sherwin-Williams Co.

Paving Material
American Brake Shoe & Fdry. Co.

Pickups, Trolley Wire
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions. (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Pipe Fittings
Power Specialty Co.
Standard Steel Works Co.
Westinghouse Traction Brake Co.

Planers. (See Machine Tools)

Pliers, Insulated
Electric Service Supplies Co.

Plugs
National Metal Molding Co.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Reinforcing
Hubbard & Co.

Poles, Metal Street
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Hubbard & Co.

Pole Sleeves
Drew Elec. & Mfg. Co.

Poles, Posts and Piling (Concrete)
Massey Concrete Products Corp.

Poles, Posts, Piling and Lumber
Duncan Lumber Co.

Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Electric Railway Equipment Co.

Power Saving Devices
Arthur Power-Saving Recorder Co.
Economy Electric Devices Co.
National Ry. Appliance Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Pumps
Schutte & Koerting Co.

Punches, Ticket
American Railway Supply Co.
Bonney-Vehslage Tool Co.
International Register Co., The
Wood Co., Chas. N.

Purifiers, Feed Water
Scaife & Sons Co., Wm. B.

Rails
Cambria Steel Co.
Foster Co., L. B.
Lackawanna Steel Co.
Midvale Steel & Ordnance Co.

Rail Grinders. (See Grinders)

Rail Joint Plates
Lackawanna Steel Co.

Rail Welding. (See Brazing and Welding Processes)
Rail Welding and Bonding Co.

Rails, Relaying
Foster Co., L. B.
Zelnicker, Walter A., Supply Co., Inc.

Rails, Steel
Carnegie Steel Co.

Railway Safety Switches
Westinghouse Elec. & Mfg. Co.

Rattan
Brill Co., The J. G.
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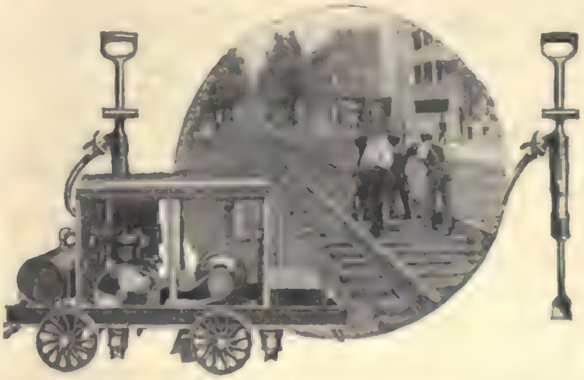

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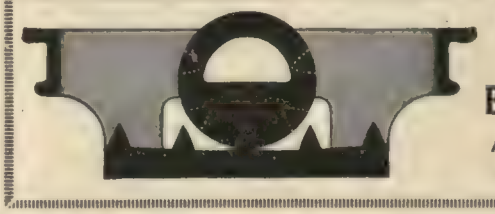

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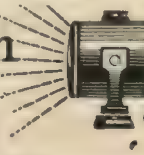

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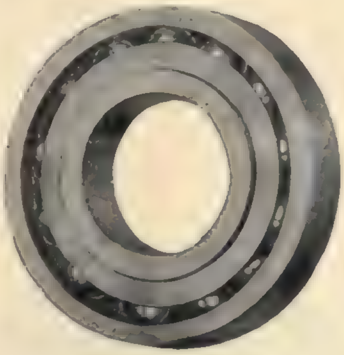

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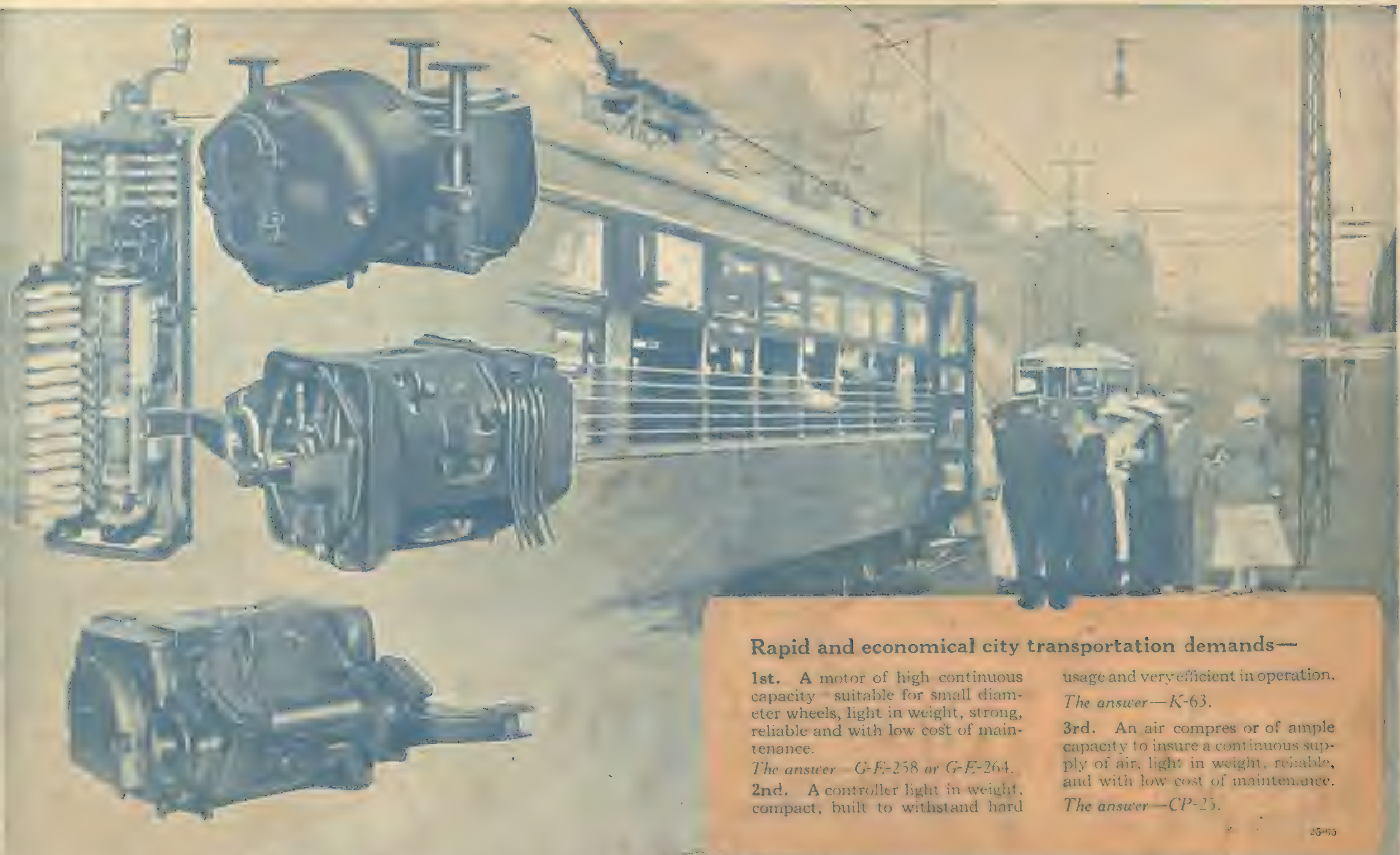

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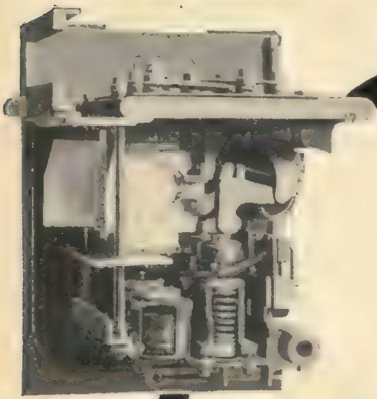

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Vol. 56, No. 22 New York, November 27, 1920 Pages 1087-1132

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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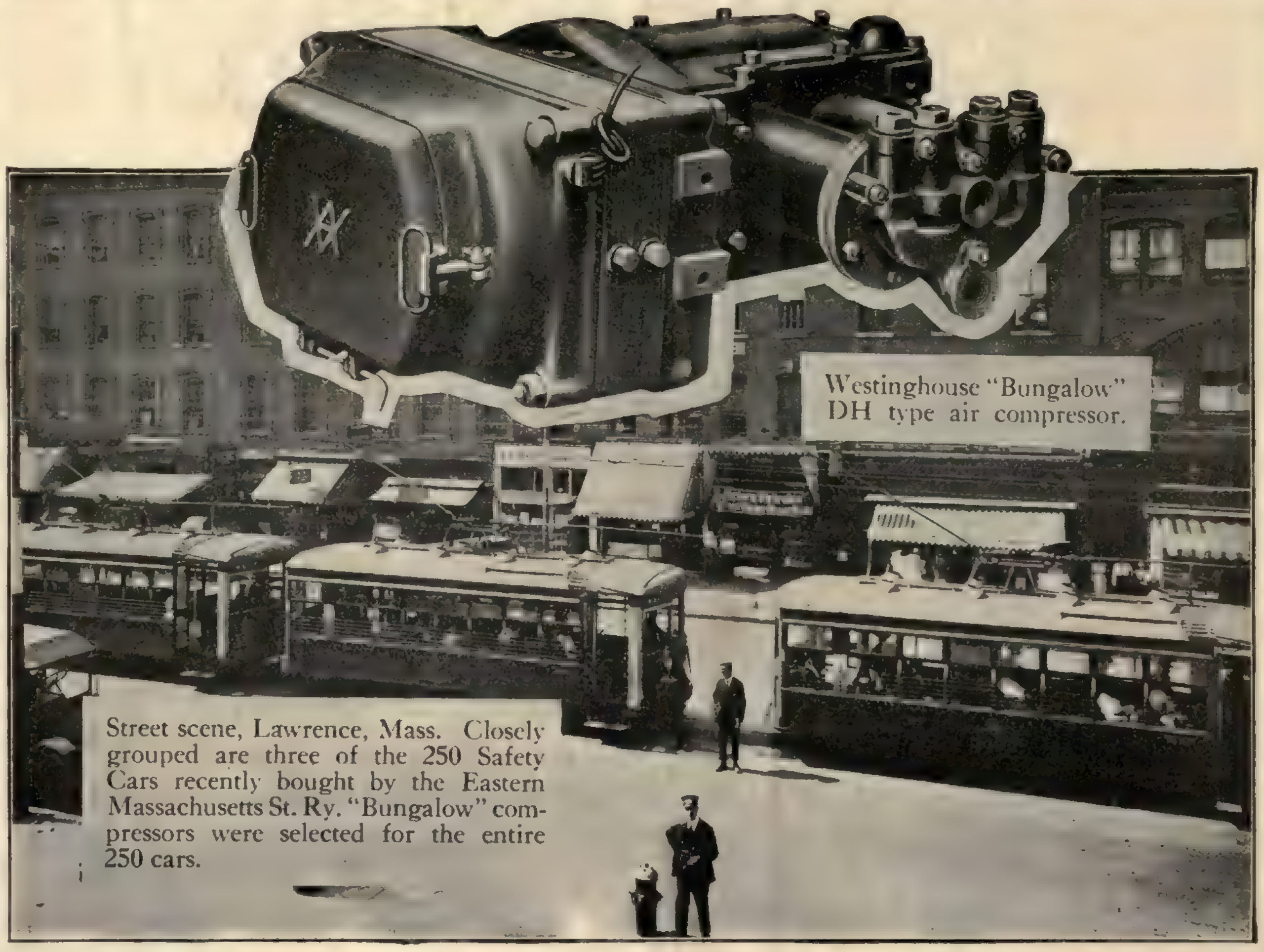

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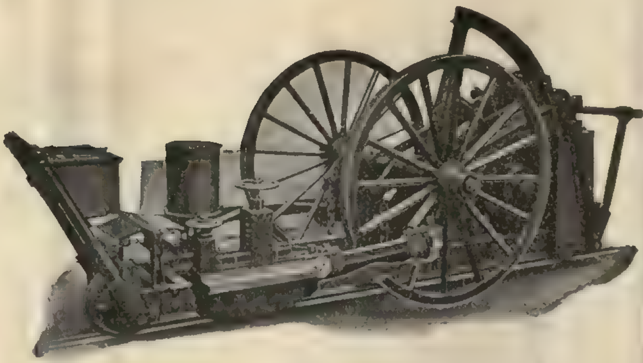

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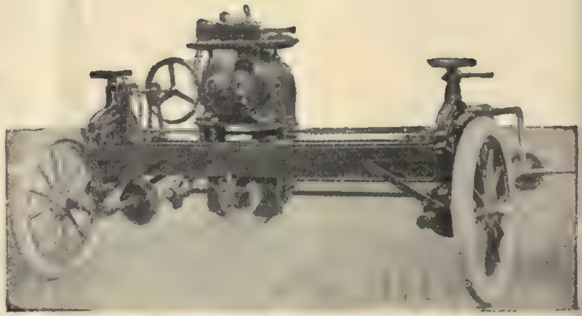

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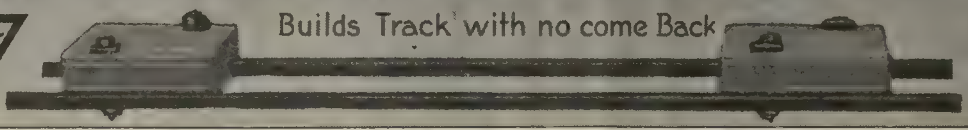

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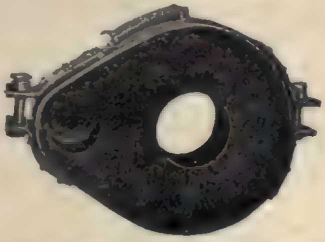

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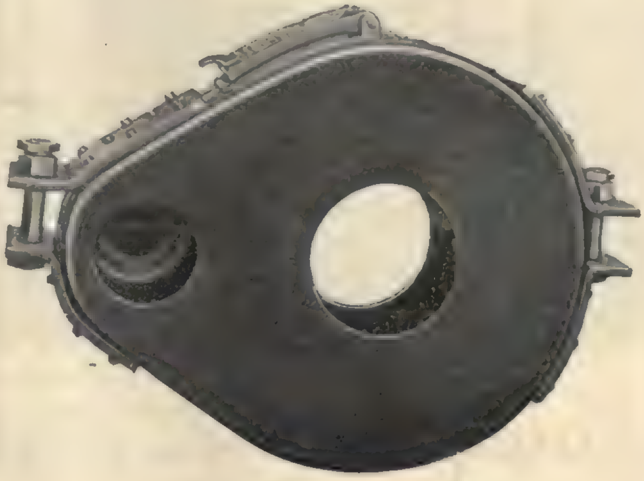

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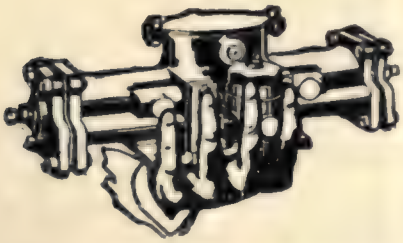

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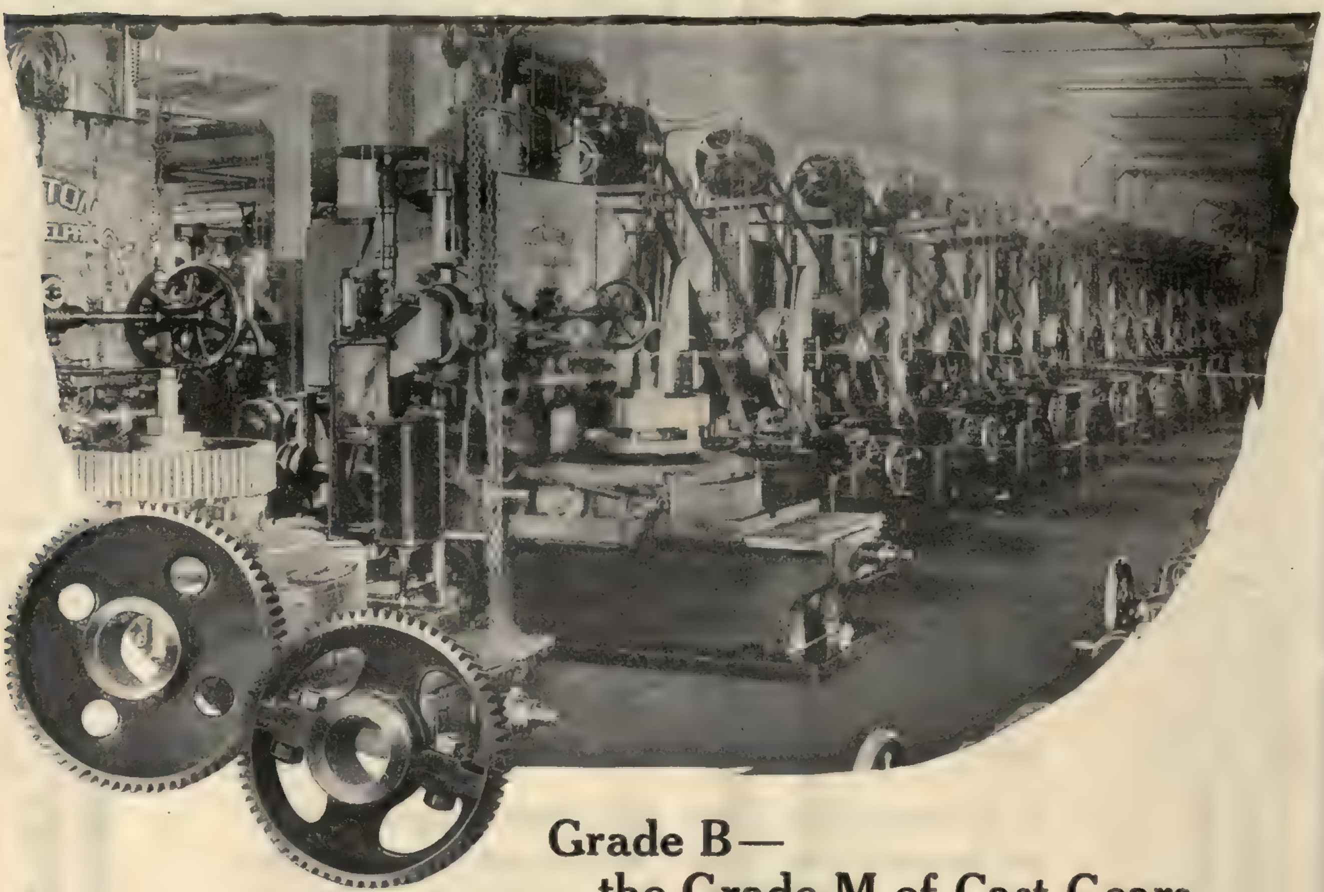

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Electric Railway Journal

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Volume 56 New York, Saturday, November 27, 1920 *Number* 22

Chicago Companies Win Against City in Commission Order

CITY officials of Chicago will find little consolation in the final order of the Illinois Public Utilities Commission in the Chicago Surface Lines fare case, an abstract of which appeared in our issue of Nov. 13. The ruling of the State body is a complete victory for the petitioning companies, granting a recognition of the full valuation contended for, a return of 7½ per cent and a continuance of the existing 8-cent rate of fare. Because of the immensity of the property involved—said to be worth at present-day reproduction prices more than $247,000,000—the summary of proceedings and the conclusions of the commission are worthy of special comment.

Since the Surface Lines' first petition was filed in November, 1918, a hostile city administration has resisted every order and has overlooked no legal technicality for possible reversal in the courts. These very attacks, however, only served to strengthen the companies' position because each resulting decision confirmed the attitude of the commission. In fact, the highest court of the State held that "the commission would be justly chargeable with neglect of duty if it had not done what it did," namely, grant emergency relief at a time when the continuance of a strike threatened the very existence of the utility. Nevertheless, the municipality is said to be planning further appeals, but having been guided by rulings of the Supreme Court in the Quincy case and the Springfield Gas case, the Illinois commissioners are believed to have framed a "bombproof" order.

An oft-repeated contention of Mayor Thompson's representatives is that the contract ordinance with the Surface Lines made it impossible to interfere with the 5-cent rate of fare. This point, however, has already been disposed of by the Supreme Court in the statement that the general assembly has never conferred upon any municipality power to make inviolable contracts for public utility rates. While continuing its objection that the State commission was without jurisdiction, the city resisted almost every proffer of evidence in the valuation proceedings. Seven different bases of valuation, all of which exceeded the capital account, were offered by the companies, but a return was asked only on the total of the capital account or price at which the companies had agreed to sell to the city. The commission did not accept the agreed purchase price *per se* as a valution for rate-making purposes, but by granting many of the deductions demanded by the city and adding other items, the resulting present valuation of property used and useful for public service was found to be at least equal to the existing capital account.

The commissioners followed the directions of the Supreme Court in the Springfield Gas case by setting forth all the elements of value declared to have been considered. They found, however, that nothing could be gained from a study of amount and market value of outstanding securities, and they disposed promptly of the city's argument that the "value for taxation purposes" should also be considered. An allowance of $20,000,000 was made for "going value," to represent the value of property destroyed as obsolete and 10 per cent which was added for cost of conducting construction.

The commission took a conservative attitude in stating that while the companies were entitled to a return of 7½ per cent on the allowed valuation and were not quite earning that amount, a higher rate of fare would not be granted because of the "possibility and probability of readjustment of operating expenses resulting from a return to normal conditions."

According to newspaper reports, the city's lawyers sought to intimidate members of the Illinois commission a few days before the final order was handed down by calling attention to the fact that a new state administration had been elected on a platform hostile to commission regulation. Chairman Wilkerson indicated by his response that he and his associates would not be swayed in their decision by this announcement. The final order was a complete answer to these attacks, and it contained the statement that "appeals to popular prejudice, involving baseless charges of so-called 'contract breaking,' are, in reality, assaults on the courts. They involve the startling doctrine that public officials shall disregard the duty which they are required to perform under their oaths of office."

Can Common Sense Control in Urban Expansion?

IF CITIES could only grow as they ought, that is according to some logical plan, vast sums of money could be saved and great inconvenience to people avoided. Unfortunately in the cases of many cities, particularly the older ones, the directions and rates of population spread have been determined by considerations other than the greatest ultimate good of the greatest number. For instance, one force, almost everywhere potent, has been the application of the skill and ambition of the real estate promoter. His desire to make money has furnished an incentive for the spread of population over larger areas. The result on the whole has been beneficial to the public, but many illogical distributions have thus occurred. Although, as Ben Franklin would have said, the promoter had an ax to grind, others besides himself benefited by the grinding of his ax, but not as much as they should have done.

The largest single factor in the spread of population has been transportation. Of course the motives of, first, the bus, and later the tramway and rapid transit line promoters was profit, just as in the other case. Transportation routes followed the lines of least resistance and of probable greatest ultimate and permanent traffic. Here again possible private gain and public good were inseparably linked, but competition and misdirected foresight sometimes caused expansion in directions not the most consistent and economical.

Congestion itself, of course, furnishes an incentive to expansion, but it is too bad for a city to wait until its inhabitants are uncomfortable or in danger from unsanitary conditions before suitable provision for their adequate housing is made. Where population growth is exceedingly rapid, however, the city fathers have a real problem on their hands, as is illustrated in New York City, Chicago, Boston and elsewhere today.

So much for incentives to growth and their effect on that growth. There is another consideration almost as vital, namely, the natural and artificial barriers which hamper growth in the directions wherein the incentives would foster it. Take, for example, New York City. This example is particularly appropriate at the moment because this issue of the ELECTRIC RAILWAY JOURNAL contains a report of a meeting of the New York Section of the American Society of Civil Engineers, held on Nov. 17, at which the transportation difficulties and possibilities of the "metropolitan district" were considered.

New York is developing largely to the eastward because that is easiest, although, logic says, abnormal expansion in that direction will be very costly to the city in the long run. To the north there is unlimited territory, but the north-and-south rapid transit lines are badly congested and facilities can be augmented only at enormous expense. To the south New York Bay separates Staten Island (Borough of Richmond) from Manhattan and, until an expensive tunnel under the bay is constructed, the island is, relatively speaking, isolated, water transportation being the only resource.

To the west the State boundary divides the city from the promising residence territory in near-by New Jersey. This imaginary line is a very real barrier to the healthy growth of the community. Even if resistance east, north and south were equalized, which it will be in time by the exercise of good engineering and skillful financing, the population spread would be forced by the State line to be fanlike rather than circular. The possible gains through symmetrical development are so great, however, that even the legal and political obstacles imposed by them ought to be overcome.

In New York the lopsidedness of the spread is particularly unfortunate because much of the supply of fuel, food and other necessities comes from the West, hence must cross or go around Manhattan. The result is not only increased direct cost but greatly augmented secondary cost through the consequent congestion. This condition tends to grow worse.

Another point to which we wish to call attention is the emphasis which Mr. Brinckerhoff, in his comprehensive paper, places upon the co-ordination of all desirable means of transportation in a city. In such a general plan each type of transportation would function where it could do so to the best advantage and as part of a well-balanced whole. The opportunities for such a comprehensive plan increase, of course, with the size of the city, although they are present wherever there are two means of transport. In the smaller cities and in those of medium size the only opportunity for union is with the trolley and bus service, each assuming the work for which it is best fitted. Where there are rapid transit lines, they should be made part of the general scheme.

While this plan has been followed in most large American cities except New York as regards rapid transit and surface lines, but few instances exist in any city in the country of the co-ordination of the services of buses and trolleys. It might be mentioned in this connection that in London the buses, trams and underground roads in the Ashfield system not only are operated under one management but pool their earnings, while a recent franchise in Paris puts both buses and trams under one management.

It is not too much to say that only in this way can the most satisfactory results be secured.

The New York situation has been treated at length, partly because it has been brought into the limelight by the A. S. C. E. meeting, partly because the transportation problem there is getting out of hand due to political and financial conditions. It illustrates what many cities are or will be up against, in lesser degree. It is hoped that concentration of attention upon the New York transportation problem at this time will point some helpful lessons of wide application, particularly as to the need for broad, future-looking city planning, which, in the case of New York and many other localities, should be large-scale regional planning.

Return to Level Rail Heads and Wheel Treads Proposed

AT THE annual congress of the Tramways & Light Railways Association, held in London on July 3, 1920, the subject of rail sections came up for extended discussion as the result of a paper presented by P. J. Pringle, M. I. E. E., wherein he raised the question of the advisability of returning to a level, flat tread for rail heads and wheels. In this paper the belief was expressed that "coned" treads on wheels and rails tended to create corrugation and that, as the life of the rail is decreased by wear, the coning of the rail tread is increased. The statement was also made that where flat, level wheel treads have been run on rails originally having flat, level treads, the rail heads became coned with a slope of about 1 in 20, but that this coning remained constant after reaching that contour. The wheel tread used had no connecting fillet between the flange and the tread.

This is a matter of particular interest because the views expressed are at variance with the recent and rather general adoption of the curved tread design for the heads of girder grooved rails in this country as well as in Great Britain and Australia, but the proposal to re-establish the flat tread is by no means new since the tramway systems in France have but recently adopted a new standard grooved rail having a level flat tread. The French action is a reversion from a design which had a curved tread contour. Unfortunately we are not advised as to the reasons assigned for the action of the French tramways.

British opinion on the subject is divided, but w believe that ultimately the British Standards Committee will settle upon the curved tread, just as th Australian and American engineers have done. Ou reason for this belief is based upon the inability of an street railway system to re-lay all of its tracks over night or to return and re-shape all of its wheel tread at one fell swoop. With a curved rail-head contour o some form prevailing, the wheel treads are bound t take their shapes therefrom.

With regard to the statement that coned rail tread and coned wheel treads tend to create corrugation, may be noted that this belief has been quite general this country, and the adoption of the curved tread on the American standard girder grooved rails was first proposed as a possible means of eliminating corrugation. While the curved rail tread has not wholly succeeded in accomplishing this result, it has certainly been the means of prolonging the time of appearance of the evil.

As far as increased rate of coning is concerned, we are inclined to the view that the increase is often due to widening of the track gage which so frequently occurs as the tracks grow old, due to the weakening of the fastenings which permit the rail heads to tilt outward. This in turn causes the head near the gage line to take more than its share of the wheel contact pressure, resulting in increased wear at or near the gage-line fillet. Such wear is often neutralized if the rails are re-gaged. We do not believe that there are sufficient data available to support a claim that either wheel-tread coning or rail-head coning is increased proportionately as the ife of the rail or wheel is decreased by wear. There are a great many things besides coning which have an nfluence upon the wear of rail heads and wheel treads.

The thought in this country is more to the effect that here may be wisdom in re-shaping our wheel treads to a concave contour, thus abandoning the conical wheel read. Some experiments have been made along this ine and the indications are that the curved wheel reads retained their original contour to a marked degree and did not acquire an increased coning. Data are insufficient to lead to conclusions relative to the comparative rates of wear between flat inclined wheel treads and concave wheel treads, but the impression has been gained that the rate of wear per thousand miles run is somewhat less on the concave treads. We hink it quite timely that the committees on equipment and way matters of the American Electric Railway Engineering Association are about to take up the study of his important phase of the subject of rail and wheel wears.

American Engineering Council Is a Going Concern

LAST Thursday, Friday and Saturday there was a meeting in Washington which was of more than rdinary importance to the engineering profession mmediately, and to the entire country ultimately. This was the first meeting of American Engineering Council, the governing body of the Federated American Engineering Societies, organized last June. The steps leading to the formation of this organization, the history f the organizing conference in Washington last June when representatives of almost 200,000 engineers were athered, and the developments since then have all been hronicled in these columns. The outstanding fact oday is that this work has resulted in an organization which is a going concern with the most praiseworthy bjects and the ability and talent to achieve results of reat value.

That Herbert Hoover should agree to accept the presidency of the new council and to add to his already eavy burden the active leadership of this organization ould and does in itself indicate the importance and haracter of the program of endeavor ahead of the ouncil.

The organization, be it plainly understood, is one for ervice for the public good. It is not so much that he engineer himself will benefit from the activities the organization, but rather that he will have an opportunity, in a new and much larger way, to put his knowledge and training, his kind of thinking, to work on problems of general and national importance. The first task outlined by Mr. Hoover, in what proved to be his inaugural address, is to solve the largest problem of today, that involving or resting upon the relations of capital and labor. This is a social problem, but one which should be susceptible of solution by engineering methods. All other methods have so far failed to find the answer.

It is with this understanding that the country as a whole and the industries dependent upon engineering particularly should welcome and give unlimited encouragement to this newly formed or accomplished association of the engineers of the nation.

Labor Assumes a New and Constructive Attitude

TAKING the statements of Matthew Wold, vice-president of the American Federation of Labor, as representing the attitude of organized labor which has crystallized out of the past few years of unprecedented unrest, it appears that the efforts of the engineers on the particular problem mentioned above as a part of the program of American Engineering Council will be most welcome to the workers of the nation. Mr. Wold indicates that labor is now ready to co-operate in any and every way to increase production and he commends especially the work of efficiency engineers and others who have been trying through scientific analysis to make each man's efforts count for more. This appears to be a change in attitude which is wholesome and from which there should be untold benefit to the entire community. It is an attitude, of course, which is nothing more nor less than should be expected from a disinterested consideration of how each man may make the most of his opportunities in whatever capacity he finds himself, but, frankly, this has not been the apparent attitude of organized labor on this subject in the past. Mr. Wold has been accused of being an opportunist, but this stand, we hold, is so patently clear and logical that to uphold it can serve no temporary purpose, but must result, if maintained with any self-respect, in real advancement.

Engineers should be particularly pleased to find that their work of years is commencing to bring fruit in a most gratifying manner. Mr. Hoover, as the newly elected president of the American Engineering Council, mentioned this subject the day after Mr. Wold's declaration, and immediately recognized the added opportunity thus thrown open to the engineers in their efforts to work for better economic and social conditions in this country.

Electric railways have always had certain difficulties in this line and have faced labor problems more complex than in most other industries. If the engineer, the scientific analyst, can be accepted by both labor and capital as the proper person to undertake the task, he can be of service which will prove invaluable to railway properties in working toward more efficient operation, in providing better service to the community and in improving the general relations between capital and labor.

It may be, as the New York *Times* says editorially, that Mr. Hoover may "bring Mr. Gompers to accept engineers as a golden bridge between labor and capital."

Spokane's Traction Problems Are Being Solved

This Article Has Particular Reference to the Inland Empire System, Recently Reorganized After a Short Receivership—While It Was in Part Overbuilt, the Property Has Attractive Possibilities

INLAND EMPIRE INTERURBAN TERMINAL IN HEART OF SPOKANE

ALTHOUGH Spokane, Wash., is a young city, having been incorporated as the village of Spokane Falls, with 1,000 inhabitants, as late as 1881, it has had a vigorous electric railway history. In fact, the growth of the local transportation business was in some respects too vigorous for financial stability, particularly that of the interurbans built to connect the city with nearby points. The result has been the development of some difficult problems, particularly on the interurban lines, which were accentuated by the war. These are now in process of being solved, although drastic means have been necessary in the process.

So many conflicting reports have been current regarding recent and prospective developments on the local properties that a representative of the ELECTRIC RAILWAY JOURNAL recently made a visit to Spokane to examine the situation at close range. This article contains the results of some of his observations.

The city has had a development which is remarkable, both as to dimensions and quality. Its location is such that it has been thrown upon its own resources more than most cities. It is situated in a rich timber and agricultural district which is the source of substantial freight and passenger business. The last census shows the city to have a population of 105,000. Its area is 39.25 square miles. To serve this population and this area it has a total of 140.5 miles of electric railway, expressed in single-track equivalent, within the city limits. Of this trackage 53.5 miles is owned by the Spokane & Eastern Railway & Power Company and 87 miles by the Washington Water Power Company. Besides the service inside the city the Spokane & Eastern Railway
connects Spokane with Cœur d'Alene, Hayden Lak
Liberty Lake and Vera, and the Washington Wat
Power Company's interurban lines connect it with Hi
yard, Medical Lake and Cheney. There is also a thi
road, the Inland Empire Railroad, which connects t
city with Colfax and Moscow. This is a single-pha
line. The Spokane & Eastern and the Inland Empire a
constituents of the former Spokane & Inland Empi
Railroad, which went through receivership, was du
sold and reorganized as two separate roads.

THE INLAND EMPIRE SYSTEM

Although the Washington Water Power Company
vitally concerned with the general transportation pr
lem in Spokane, it is pursuing the even tenor of
way struggling to make ends meet on a 6-cent fa
The most pressing local problems are those now in pr
ess of solution on the Inland Empire System, whi
has been "through the mill" during the past few yea

When F. E. Connors was asked to go to Spokane
receiver for the Spokane & Inland Empire Railroad
January, 1919, he found it necessary to study the pr
erty minutely to discover the causes of its financ
difficulties and the possibilities of improving its earni
capacity. Mr. Connors is of an optimistic temperam
and he approached his task in a cheerful frame of mi
And he needed it. He discovered that the prope
was hopelessly behind in its finances, although posse
ing a fairly adequate equipment. He first had a co
prehensive summary made of the data regardi
the property, showing that it had been formed
the consolidation of four original corporations, the Co

d'Alene & Spokane Railway Company, Ltd., the Spokane Traction Company, the Spokane Terminal Company and the Spokane & Inland Empire Railroad Company. As of Jan. 1, 1919, the total of bonds of these companies outstanding was $4,414,500. The records showed also that in 1911 Henry L. Gray made a report on the actual cost, cost of reproduction and depreciated value of this property. The book cost as of Jan. 1, 1911, was $24,820,000 approximately. He estimated the cost of reproduction as about $13,922,000 and the depreciated value as about $12,133,000. In November, 1918, A. J. Witchell, chief engineer of the property, estimated its junk value as $5,950,000, included with which was the book value of the Nine-Mile power plant, $1,350,000.

VICE-PRESIDENTS CONNORS AND PAINE
(Mr. Connors is at the right)

A BIRDSEYE VIEW OF THE SYSTEM

Statistics are dry, but it is necessary to give a few facts regarding the property, as compiled for Mr. Connors by the department heads, in order that any discussion regarding it may be comprehensible.

First as to the system as a whole, Mr. Connors found on his hands a property consisting of two distinct divisions, one known as the "Interurban Division" and the other as the "Traction Lines." The former comprised 168 miles of main track, 18 miles of second tracks and 39 miles in yard tracks, sidings and spurs. On the traction line the respective figures were 44, 12 and 7 miles in round numbers. In the city of Spokane there was a total single-track equivalent of 53½ miles. In the city 9.3 route-miles was double track in paved street and 2.8 miles was single track. The interurban equipment included thirteen electric locomotives, fourteen passenger coaches, five combination motor baggage, express and mail cars, two combination motor and baggage cars, fifteen combination motor baggage and passenger cars, seven combination motor and baggage cars, two parlor cars, 136 flats, 212 box cars, five cabooses, fifteen gondola cars, nine stock cars, six refrigerator cars, eleven work cars and two automobile cars. The "traction" equipment, including the Vera line, included seventy-six passenger cars, two trailers, seven work cars and one electric motor truck.

Mr. Connors found the property equipped with a fair shop, with an adjoining carhouse and yard. On the traction side of these provision was made for a total storage capacity of ninety-two cars; there being five tracks in the carhouse with a capacity of four cars each, a track in the carpenter shop with a capacity of four traction or two interurban cars, a track in the paint shop with a capacity of six traction or two interurban and two traction cars, and trackage in the yard for sixty-two cars. On the interurban side there were two tracks for three interurban cars each, one for two interurban and two for one, each equipped with a 15-ton electric crane for heavy repairs. The yard storage capacity was for thirty interurban equipments, so that a total of forty interurban cars could be stored.

With the shops working full capacity, eight equipments could be put through per month for general overhauling; that is, three interurban and five traction equipments. The track repair facilities at full capacity could handle 225 box cars for medium and light repairs per month. As no changes have been made in the shops and yards as yet, that being a part of the property that Mr. Connors thought could wait until more pressing matters were cared for, these data are substantially correct for the present date.

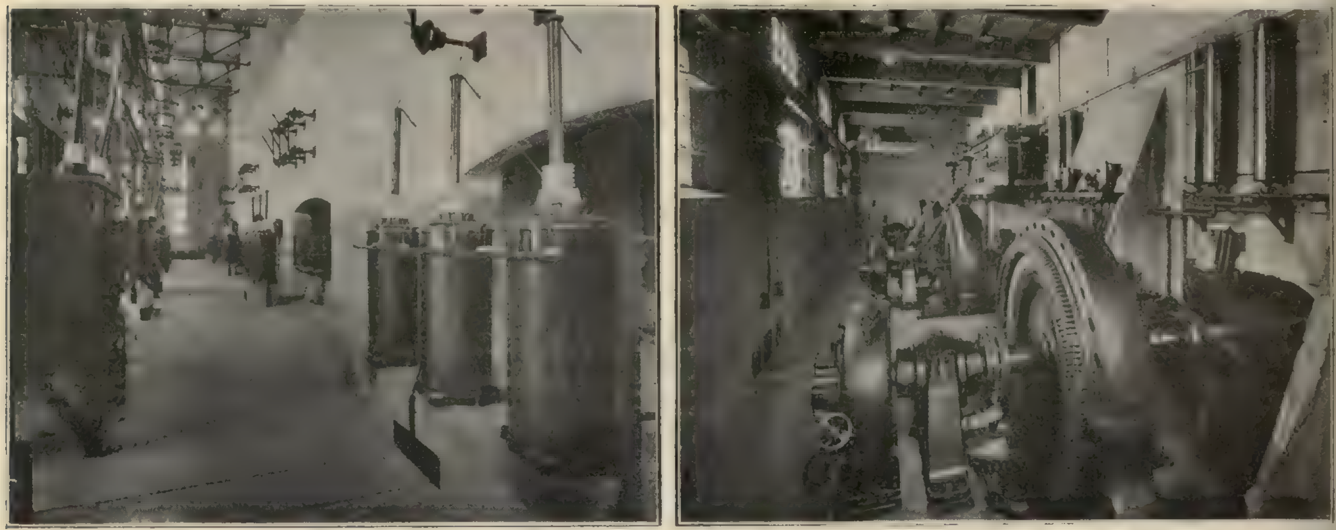
COMPANY OWNS MODERN WATER POWER PLANT

Now, as when Mr. Connors arrived on the scene, power for the traction and interurban lines and for industrial customers is supplied partly from a plant located at what is known as the "Nine-Mile Bridge" on the Spokane River, approximately 10 miles below Spokane. Construction on this plant was started in 1906 and the plant was put in commission in July, 1908. The dam is of the spillway type of construction, of concrete, 58 ft. high and 225 ft. wide. The power house, which is built as a part of the dam, is of brick and concrete construction approximately 82 ft. high x 65 ft. wide and 115 ft. long. It contains four 5,000-hp. Hercules turbines, of the open-flume type, built by the Holyoke Machine Company. These are controlled by oil pressure governors of the Lombard type. There are four double-leaf headgates to each wheel chamber, each 4 ft. x 20 ft. in dimension and electrically operated.

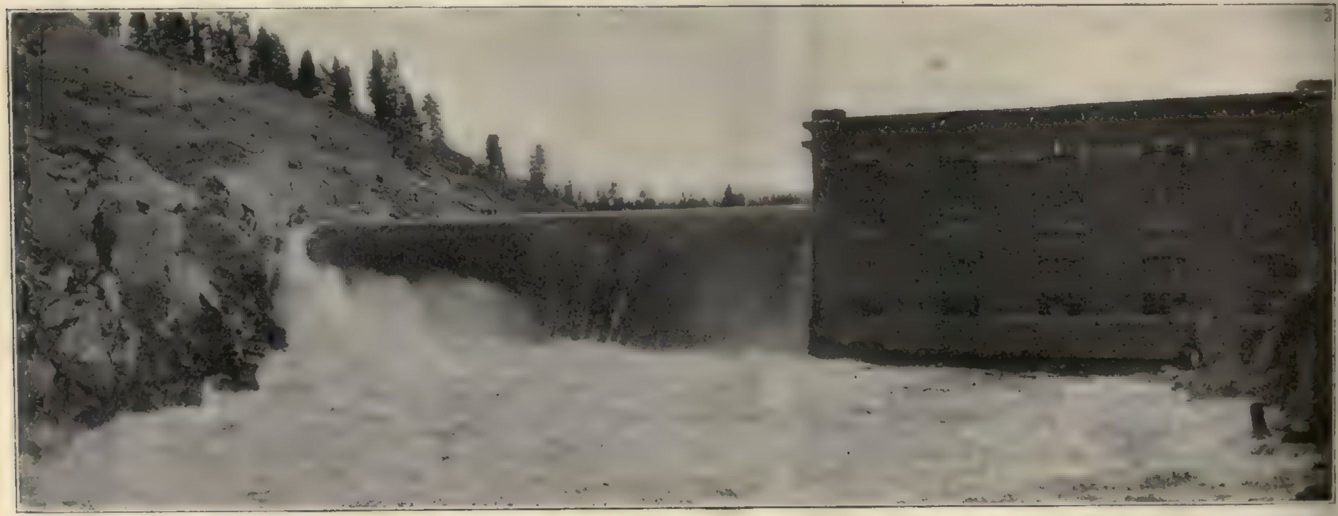
In the plant are four 3,000-kva. Westinghouse three-phase, 60-cycle, 2,200-volt generators, star-wound with neutral grounded, the power house being the only place where the neutral is grounded. In addition to the governor control of the turbines there is a water rheostat arranged to take the load in case of failure of the outside lines.

During the average low-water stage of the river the plant has a continuous twenty-four-hour output of 7,000 kw. Ability to handle peak loads lasting over natural periods is provided for by placing a temporary flashboard dam 4 ft. high on the dam's crest.

A crew of eleven men is required to handle the plant, including a foreman, a mechanic, release operators, etc. All mechanical and electrical repairs are made by the permanent force of men.



HIGH-TENSION AND GENERATOR ROOMS IN NINE-MILE BRIDGE PLANT. GENERATORS ARE DRIVEN BY 5,000-HP. TURBINES



NINE-MILE BRIDGE HYDRAULIC PLANT SUPPLIES PART OF SPOKANE'S RAILWAY POWER

SWITCHING, PROTECTIVE AND OTHER HIGH-TENSION APPARATUS IN THE NINE-MILE BRIDGE POWER PLANT

Power from the plant is sold to the Spokane Paper Company to the extent of nearly 20,000,000 kw.-hr., and more than 5,000,000 kw.-hr. to other customers annually.

SOME FACTS REGARDING THE POWER TRANSMISSION SYSTEM

From the Nine-Mile power plant duplicate transmission lines are carried over leased right-of-way 100 ft. wide, minimum, to a point inside the city limits of Spokane. These lines are 60,000-volt, three-phase, and they lead to what is known as the "City Substation." This supplements power purchased from the Washington Water Power Company. It contains two 1,500-kw. motor-generator sets, one 2,000-kw. set, four 2,000-kw. transformers and one 2,500-kw. booster set. The substation is used for regenerating power for use on the city lines and handling interurban cars into and out of town. It is also used as a high-tension switching station.

There is also a frequency-changing station for the supply of power to the single-phase division, containing four 1,000-kw. motor-generator sets, two 960-amp. booster sets and one 275-cell, 1,980-amp. battery with necessary auxiliary apparatus. This station is used to change the current from 60 to 25 cycles. The maximum demand upon it is about 2,500 kw. and the output 17,000 kw.-hr. daily. During the wheat-handling period the respective figures are 4,000 kw. and 25,000 kw.-hr.

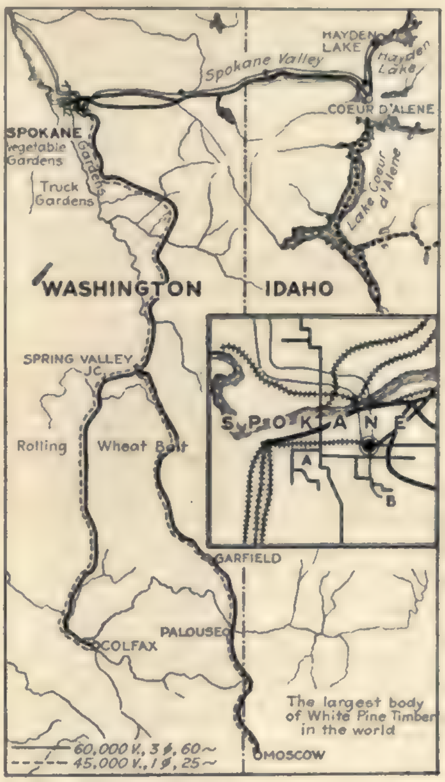
On the Colfax-Moscow interurban lines there are ten substations located approximately 10 miles apart, of standard design. They are of brick and concrete, and contain 375-kva. oil-insulated, self-cooled, single-phase, 25-cycle transformers, which transform the voltage from 45,000 to 6,600 for the contact system. No regular attendants are kept in the substations, the attendants in the adjoining passenger stations looking after the apparatus. The single-phase line which feeds the substations is carried along the right-of-way on wooden pole construction.

The 6,600-volt overhead on this line is of single catenary construction, the 7/16-in. messenger supporting No. 000 grooved copper trolley wire. A small amount of commercial power is sold along this route.

The Cœur d'Alene line is a 600-volt direct-current line and power is supplied by a three-phase, 60-cycle, 60,000-volt circuit which also serves the paper company. There are four substations, which differ in capacity and construction, along this line.

The above summary gives a tangible idea of the physical property that Mr. Connors had to work with on taking charge of this property. It does not cover the personnel, which formed an intangible but very real part of the assets. Vice-President Waldo G. Paine, Superintendent J. F. Gannaway and other heads of departments had the operating details well in hand and co-operated with the receiver in the program of giving better service at less cost. With the assistance of these colleagues Mr. Connors immediately instituted a régime of rigid economy, pending the inauguration of plans for increasing the income, and he laid his problem frankly before the public, the City Council and the Public Service Commission. He made clear to those interested that wage increases and desired improvements in service could only be made when an adequate income had been secured. As receiver, Mr. Connors made an excellent impression on the "powers that be," and when the road was sold under foreclosure he was elected vice-president and general manager. He is building up a popular interest in the property, which is now about making operating expenses, including taxes and bond interest. His chief difficulty is with the Inland line, which is too expensive an operating proposition for the available business. Just how this will work out remains to be seen.

Of course the principal business of the Inland Empire system is interurban passenger and freight service. The city lines should be operated jointly with those of the Washington Water Power Company by one company or the other. For years plans to this end have been in preparation and still are so. One-half or more of the gross income of the property comes from freight traffic, from $700,000 to $800,000 per annum being derived from this source. The company has also a large regular and seasonal passenger traffic between Spokane, Colfax, Moscow, Liberty Lake, Hayden Lake and other points.



INLAND EMPIRE RAILWAY AND TRANSMISSION LINES

Since Jan. 1, 1919, there has been a substantial growth in the company's business. This is partly attributable to the public appreciation of the fact that the road is not a steam railroad subsidiary although it interchanges freight with steam roads and owns considerable freight rolling stock. Further, new industries are locating along the railway lines, bringing substantial and steady traffic increases. The use of good publicity methods is also a factor in this development.

In the way of improving passenger service, a new four-car daily train from Spokane to Moscow, Colfax and intermediate points has been added, with excellent financial results. While this line has steam competition the business that is being built up is to a great extent new business.

Economies are also being introduced by a process of elimination. For example, at Hayden Lake, an important traffic point about 40 miles from Spokane, the company has leased the hotel, which it owns, thus relieving itself in an unprofitable enterprise by transferring it to an individual who can easily make it profitable. It was necessary originally to build and operate this hotel in order to make a delightful resort available to possible patrons. As many patrons of the hotel and golf course now reach the lake by automobile there is less incentive to the railway to operate the hotel than there was formerly.

GANTRY ROOM IN THE NINE-MILE BRIDGE POWER PLANT OF THE INLAND EMPIRE SYSTEM

The company has also sold its development at Liberty Lake, 16 miles from Spokane. This point is the source of a satisfactory traffic, the round-trip fare being 75 cents for adults before 3 p.m., 50 cents thereafter, with half fare for children. By concentrating on the transportation phase of this arm of the business the management is able to get the best returns. For several years the railway also owned a baseball team as a means of inducing traffic. This venture never paid and has been discontinued.

The Inland Empire System has long been famous for its excellent freight service, which is given in keen competition but also in close co-ordination with the steam roads. During the year as many as 12,000 cars of lumber, 4,000 of grain, 1,000 of apples and many of miscellaneous products originate on its lines. Its great appeal to patrons, particularly in l.c.l. business, is the promptness of the service, trains being made up about midnight with terminal delivery at 6 a.m. Of the company's nearly 500 freight cars a considerable number strayed during the war and have not since "turned up."

The freight department is operated strictly along steam road lines, similar freight terminals being employed. The company owns its right-of-way to these terminals. On the Moscow line each crew makes 178 local freight-train miles per day, six days per week, averaging twelve loads. All runs are made within the sixteen-hour limit and a crew consists of a conductor, a motorman and two brakemen. The Colfax line schedule calls for 154 local freight-miles per day. The railway furnishes no trucking service.

Spokane is a city with a small, compact business district. The car lines loop around this, connecting it with the several residence districts, and there is comparatively little cross-town and short-haul riding. The fare is 6 cents, and while tickets at the same rate are furnished for the convenience of patrons, few use them, say 5 to 6 per cent of the total. These tickets are sold by conductors and a number of storekeepers. The cars are largely one-man operated, having been rebuilt for this purpose. Ultimately all cars in the city (including those of the Washington Water Power Company) will be thus operated. Neither company has at present any cars of the safety type. No difficulty in fare collection is reported and there appears to be little delay in loading owing to the extra duty placed on the motorman. No fare boxes are used, the collections being recorded by means of overhead register.

Baseball Fans Speedily Transported

FOR the World's Series baseball games at Cleveland, the Northern Ohio Traction & Light Company operated a nine-car interurban train daily out of Akron. This train left the Terminal Building at 10:10 o'clock every morning and arrived in Cleveland at 11:40 a.m. Leaving the Terminal Building the train was cut in three sections and after leaving its Silver Lake Junction station the train was coupled at Fells and operated as a solid train to Newburg, the city limits of Cleveland, where it was again cut in three sections. The company operated special interurban trains every day from all points along its line and carried thousands of baseball fans to the series. It was the first time an attempt was made to operate a nine-car train over the lines of the Northern Ohio Traction & Light Company. The train made an attractive appearance, most of the cars being new.

SPECIAL NINE-CAR TRAIN, WHICH CARRIED WORLD'S SERIES ENTHUSIASTS TO CLEVELAND

Transportation for Greater New York

Civil Engineers Discuss Plans for Metropolitan District—H. M. Brinckerhoff Recommends Balanced Development by East and West Lines—Discussion Participated in by Representatives of Rapid Transit Commission, Transportation Companies and Others

THE transportation needs of Greater New York was the topic considered at a meeting of the New York Section of the American Society of Civil Engineers, held at the Engineering Societies Building, New York, on Nov. 17. An invitation to be present had been extended by this section to the Metropolitan Section of the American Society of Mechanical Engineers and to the New York Section of the American Institute of Electrical Engineers. The subject, whose official title was "Urban and Suburban Passenger Transportation," was introduced by a paper presented by Henry M. Brinckerhoff of Parsons, Klapp, Brinckerhoff & Douglas, consulting engineers. W. J. Wilgus, consulting engineer, and formerly vice-president New York Central Railroad, acted as chairman of the meeting. Abstracts are given of Mr. Brinckerhoff's paper and of the discussions which followed it.

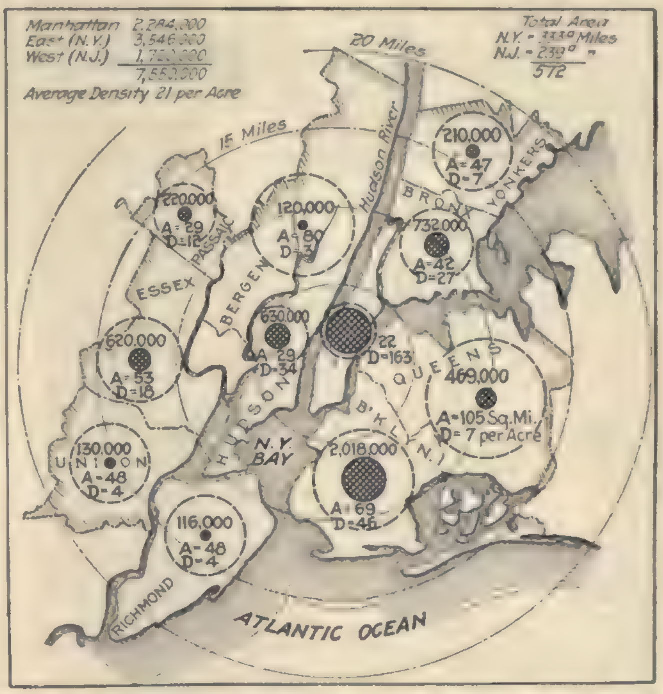


FIG. 1—METROPOLITAN NEW YORK AS DEFINED BY THE CENSUS BUREAU, SHOWING AREA (A) IN SQUARE MILES, POPULATION, AND POPULATION DENSITY (D) IN INHABITANTS PER ACRE

Address of Mr. Brinckerhoff

LET us first free our minds of our habitual ideas of New York as Manhattan Island and think rather of the great surrounding district extending even outside of the five boroughs of Greater New York. The population of Manhattan New York, by the 1920 United States census is 2,284,103, or nearly 50,000 less than in 1910. Old Manhattan New York as an independent, self-contained city no longer exists. Part of its residential population has been forced out and beyond its borders by the crowding in of business, and others of its citizens have been tempted to move across the rivers by the improved transportation offered by its enlarged rapid transit lines.

For our purpose we may take the New York Metropolitan District substantially as defined by the United States Census Department, which includes in New York State the five boroughs of Greater New York and Westchester County north to include Yonkers and New Rochelle. On the New Jersey side it takes in all of Bergen and Hudson counties and parts of the counties of Passaic, Essex and Union. This district is shown in the first accompanying map and is outlined by a heavily shaded broken line. Taking the intersection of Thirty-fourth Street and Fifth Avenue of Manhattan as the urban center of activity and describing circles with 5, 10, 15 and 20 mile radii we find that this Metropolitan District lies mostly within the 15-mile circle and all within 20 miles of the center. It is true that there are in this territory many entirely independent, unrelated classes of people and interests, but we also find a constant growth in the commoner functions of city life. The trains, for instance, not only carry workers morning and evening from Newark to New York, but also simultaneously from homes in New York to employment in Newark. The average population density of this district is 21 per acre, which is the same as corporate Chicago in 1916.

The conception of this whole district as a Metropolitan unit, a single city, involves an urban and suburban traffic view in which Manhattan Island figures as the central delivery district for this larger area, with subcenters of activity in Brooklyn, Newark, Yonkers, etc., but all related to one another by the common necessity of easy, frequent passenger intercommunication. Outside our central Metropolitan limits we must visualize a further zone of strictly suburban character, contributing daily riders to and from the center, but less closely tied to the city district in other respects.

AREA AND DISTRIBUTION OF POPULATION OF METROPOLITAN DISTRICT

Looking at our map we see that the axis of Manhattan Island north and south almost exactly divides this Metropolitan District in two equal parts. In Table I are given the areas in square miles of the boroughs and counties and parts of counties included. In each case the areas not suitable for residence, such as the marshes along the Hackensack River and bordering Jamaica Bay, have been omitted. This division shows New York with 333 sq.miles and New Jersey with 239 sq.miles.

TABLE I—AREA OF BOROUGHS AND COUNTIES IN METROPOLITAN DISTRICT

Manhattan	22 square miles	14,000 acres
Brooklyn	69 square miles	44,000 acres
Bronx	42 square miles	27,000 acres
Queens	105 square miles	67,000 acres
Richmond	48 square miles	31,000 acres
Yonkers (Westchester)	47 square miles	30,000 acres
Total in New York	333 square miles	213,000 acres
Bergen County	80 square miles	51,000 acres
Hudson County	29 square miles	18,500 acres
Passaic County	29 square miles	18,500 acres
Essex County	53 square miles	34,000 acres
Union County	48 square miles	31,000 acres
Total in New Jersey	239 square miles	153,000 acres
Grand total area, Metropolitan District	572 square miles	366,000 acres

Table II shows the population for one hundred years by fifty-year periods of the Metropolitan District and the densities per acre at present.

Two points are important to be noted from this table, *i.e.*, the ratio between the population east and west of the river has been constantly decreasing during the past one hundred years. The denser and larger population groups were originally located close to the harbor shipping development, but this characteristic is passing with the increase in manufacture and distribution of population by the rapid transit lines. The eastern or New York territory shows particularly the wider distribution and the New Jersey side in points like Newark and Paterson has been affected by the manufacturing distribution.

This means that in the past New York harbor development as a port in a general way confined the location of dense population in districts close to the shipping activities. With the rapid transit development on the New York side came the ability to live at great distances from employment centers which then produced the rush to the Bronx, Queens and Brooklyn.

TABLE II—POPULATION DISTRIBUTION IN METROPOLITAN DISTRICT

	1820	1870	1920	Population per Acre 1920
Manhattan	123,000	942,000	2,284,000	163
Brooklyn	11,000	420,000	2,018,000	46
Bronx	....	....	732,000	27
Queens	22,000	74,000	469,000	7
Richmond	6,000	33,000	117,000	4
Yonkers	1,600	18,000	210,000	7
Total in New York State	163,600	1,487,000	5,830,000	Ave. 27
Bergen County	9,000	30,000	120,000	3
Hudson County	9,000	129,000	630,000	34
Passaic County	....	39,000	220,000	12
Essex County	12,000	133,000	620,000	18
Union County	....	31,000	130,000	4
Total in New Jersey	30,000	362,000	1,720,000	Ave. 11
Total for Metropolitan Area	193,600	1,849,000	7,550,000	Ave. 21
Ratio of New York to New Jersey	5½ to 1	4 to 1	3½ to 1	

TRANSPORTATION GROWTH IN THE METROPOLITAN DISTRICT

When New York was limited to Manhattan Island the transportation lines naturally developed north and south the long way of the city. Generally speaking, business was downtown (south) and the residence sections uptown (north). So long as New York as a city was confined to this long narrow island this characteristic prevailed, but when the population began to overflow and inter-business relations among the neighbor cities grew closer a spreading-out process commenced. The great dual subway system financed by the city of New York followed the north and south idea on Manhattan Island but branched out north, east and southeast into the Bronx, Queens and Brooklyn. We have now the further plans of our public service commissioner, the result of a long study by the chief engineer, Mr. Turner. Hampered by the limitations of state boundaries, he has followed to a logical conclusion the result of distributing further large population increases by lines built exclusively in New York State and leaving the New Jersey side to take care of its own problem.

Mr. Turner predicts that corporate New York (the five boroughs) will grow to nine million population by 1945. He finds by a further development of the idea of north and south rapid transit lines on Manhattan Island that at least two eight-track subway lines will be required. Each of these will have two levels of four tracks in a single street. The total number of north and south subways and elevated tracks on Manhattan Island following this plan will ultimately be forty-eight. This is shown to be necessary in providing for continued distribution of population along rapid transit lines in Bronx, Queens, Brooklyn and Richmond Boroughs on these general lines.

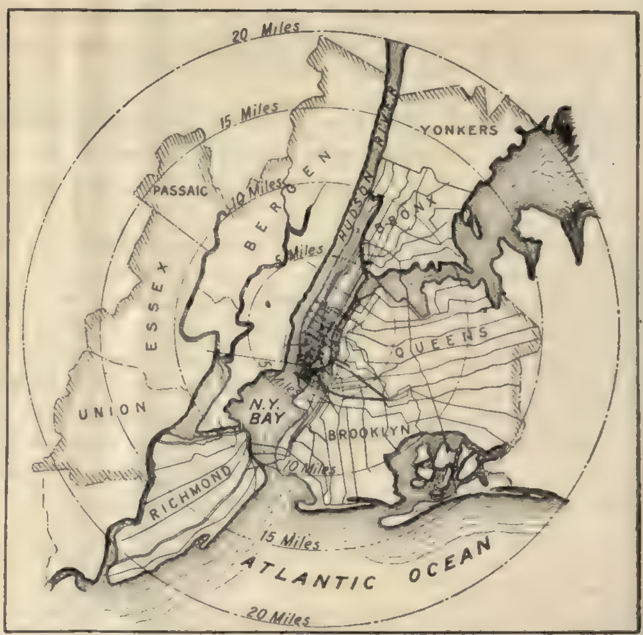


FIG. 2—EXISTING RAPID TRANSIT LINES AND LINES PROPOSED FOR CONSTRUCTION BY NEW YORK TRANSIT COMMISSION

Turning to our population charts we see that from the standpoint of Manhattan Island as a delivery district sparsely settled areas are available west of the river at shorter distances than to the east, which should warrant their consideration.

From a general economic standpoint the fact is apparent that the vital necessities for the maintenance of a great city population, food, fuel and water, come to this Metropolitan District from the west and that the cost of transporting the two former from the west side of the district to Brooklyn and Queens is almost as great as hauling from Pittsburgh to Newark.

PROVIDE MORE TRANSPORTATION WEST OF THE HUDSON

This line of thought naturally leads to the suggestion that from the Metropolitan standpoint at least a portion of future population increases should be provided for west of the Hudson. This can most readily be accomplished by east and west rapid transit lines running from Queens or Brooklyn to Bergen and Hudson counties in New Jersey and passing right across Manhattan Island. This is warranted and would bring about a better distribution of population relatively to Manhattan as the center of the whole Metropolitan area.

A rectangular system with transfers at the intersections would tend to distribute the business development more evenly across Manhattan Island instead of the great local congestion which must result along the avenues from four and eight-track subways built exclusively north and south. A shorter average haul to the delivery district would also be obtained and more balanced two-way traffic developed than by forcing the population growth entirely to the east.

On map Fig. 3 a general suggestion for such lines is shown to convey the idea of a gridiron system in relation to the whole Metropolitan area. These east and west rapid transit tracks could be fed by the transfer from the present or new surface lines.

The upper line crosses Manhattan at 125th Street, penetrating Bronx Borough in one direction and Bergen County, New Jersey, in the other.

The next line utilizes the Queensboro Bridge and reaches Flushing and vicinity, while in the west, after crossing the Hudson River, it crosses the southern part of Bergen County and extends to Paterson.

The third line from the north is located as an extension of the Steinway Tunnel across Forty-second Street, then under the Hudson and west to tap the territory of Bloomfield and Montclair.

A more southerly line connects with the B. R. T. Broadway Elevated and runs on the Williamsburg Bridge, thence across Manhattan to Jersey City, to Newark and the Oranges.

TABLE III—CLASSES OF TRANSPORTATION AND THEIR DAILY TRAFFIC, NEW YORK METROPOLITAN DISTRICT

	Per Cent of Total for Whole Met. District
Buses.	
Fifth Avenue Company and City Buses	2
Steam railways entering New York	4
Ferries	5
Surface lines	35
Rapid transit:	
Elevated and subways	54

The lowest line is shown running from one of the Brooklyn lines across the tip of Manhattan Island and striking Jersey at the Central Railroad of New Jersey stations.

On the Jersey side is shown a north and south line intended as a connecting and distributing line to divert as far as possible north and south transfer from Manhattan and allow of operation into and across the city from many districts. This line reaches from some point on Staten Island under the Kill von Kull, then by elevated north probably west of Union Hill.

The general idea is short trunk lines east and west with feeders from a constantly widening area.

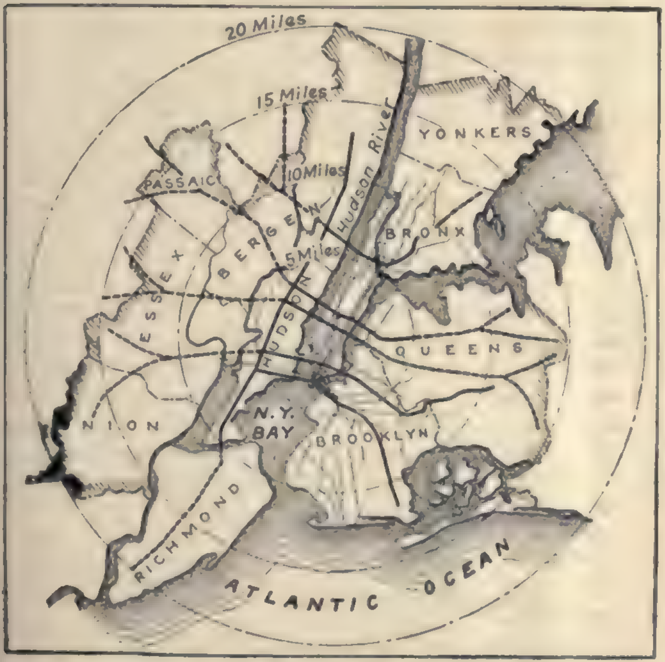


FIG. 3—PROPOSED RAPID TRANSIT SYSTEM TO DEVELOP METROPOLITAN NEW YORK REGARDLESS OF STATE BOUNDARIES

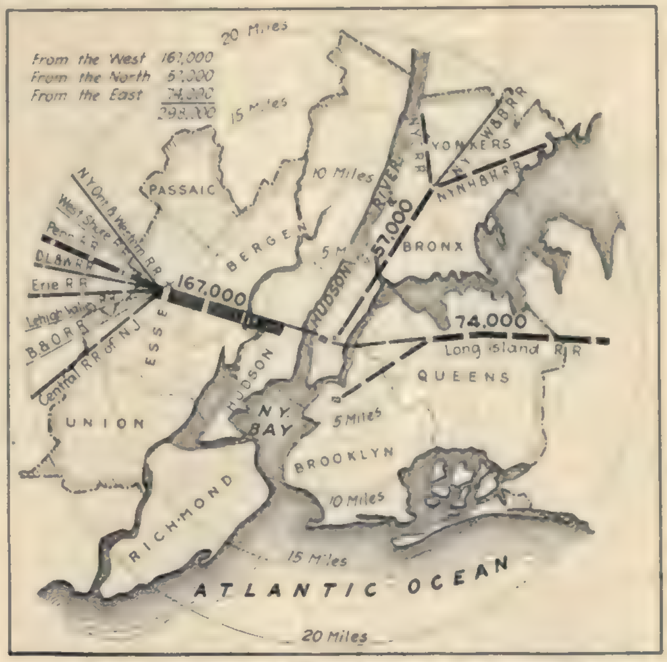


FIG. 4—AVERAGE DAILY ONE-WAY PASSENGERS INTO MANHATTAN OVER THE TRUNK LINE RAILWAYS

PRESENT TRANSPORTATION MEANS

More interesting to the average man than the future is the question of how he is to get to and from his work now. Having analyzed the general conditions and pointed out broad lines for thought upon the general scheme, we can turn to our own troubles of today. Upon what transit facilities are we now dependent in Metropolitan New York? In the reverse order of their importance by volume of passengers handled daily they are as shown in Table III.

This subdivision of traffic is peculiar to New York. In London the rates are as follows:

	Per Cent of Total
Bus	33
Surface cars	27
Rapid transit	40

In Chicago the situation is different again, the rapid transit lines being less developed:

	Per Cent of Total
Surface cars	73
Rapid transit	21
Steam suburban	6

Turning to the map Fig. 4 of our Metropolitan District we are shown the passengers delivered to the central (Manhattan) delivery district by the "steam" railway lines from the west, north and east. To make the chart effective and easily read all the lines entering from the west are shown by a single band, and similarly for those from the north and from the east. The width of the bands in each case indicates the number of passengers per average weekday.

PASSENGERS DELIVERED TO MANHATTAN BY STEAM RAILWAY LINES ON AVERAGE WEEKDAY

From the west	167,000
From the north	57,000
From the east	*74,000
	298,000

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*Including those delivered by the Long Island Railroad to Brooklyn and Queens.

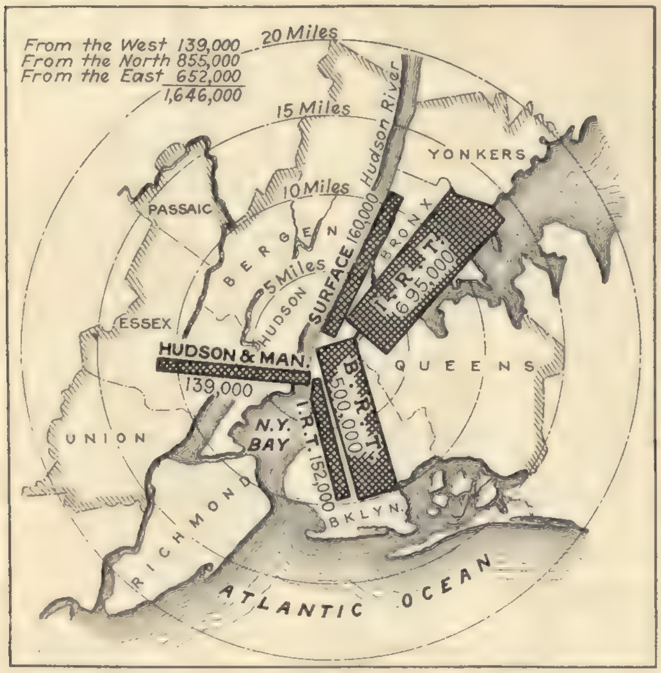


FIG. 5—AVERAGE DAILY ONE-WAY RAPID TRANSIT PASSENGERS IN METROPOLITAN NEW YORK

The total traffic carried to Manhattan by ferries from all sources is shown in the table below. The number of passengers carried by these ferries originating in the districts adjacent to the ferries or brought to them by trolley or bus lines is shown in the second column of the following table. The attempt has been made to separate this travel from that shown as of "steam railway" origin. The various railroad companies have separated their ferry traffic for us in that manner.

FERRY TRAFFIC TO MANHATTAN
(One Way)

	Total	Local
From the west	142,000	67,000
From the east	29,000	29,000
From the south	30,000	30,000
	201,000	126,000

Map Fig. 5 shows bands to a uniform scale totalizing the previous figures and showing about two million passengers entering Manhattan below Fifty-ninth Street in a week day.

CENTRAL DELIVERY DISTRICT

Into lower Manhattan, *i.e.*, below Fifty-ninth Street, or an area of 10 square miles, there are daily poured two million people. This means almost doubling the population of the island. Judging from the fact that the resident population as shown by the recent census has decreased 50,000 in the past decade the influx of daily non-residents may be conceived of as forcing the residents off the island.

This daily inflow to lower Manhattan is equal to one-fourth of the population of the Metropolitan District, but of course a portion come from upper Manhattan and a small number from suburban territory beyond the limits selected. A study of the rate at which this centralized traffic has increased and the fact that it had developed largely coincident with the great rapid transit development of the past twenty years is cause for careful consideration before we adopt either the rate of increase shown or the growth of the traffic itself.

We know that the old law thought to be fundamental during the period of development of electric traction, that the riding per annum per capita of population increased as the square of the population, cannot be applied to an increase from 1,000,000 to 5,000,000, for instance. In dealing with this matter quantitatively we must, therefore, be on our guard.

Subcenters, like the retail district of Brooklyn and Newark, will grow in importance and a reaction must set in against such continued increased concentrations. Such a subcenter development will mean more local traffic of a type quite different from that carried by our long rapid transit lines.

COMPARATIVE COST OF PASSENGER CAPACITIES OF DIFFERENT TYPES OF TRANSPORTATION

The most expensive type of transportation used by urban and suburban travelers in the New York Metropolitan District is the steam railway penetrating to the heart of Manhattan and using a large terminal station. Fortunately for the later solution of the problem the volume of this travel is relatively small compared to the rapid transit and surface lines.

It is a fact, however, not generally realized, that as a city grows not only does its own local and suburban traffic into these great "steam" railway terminals increase, but the long distance travelers grow in number also at an equal or even greater rate. With limited track capacity for carrying these two classes of traffic both cannot increase indefinitely. One or the other must ultimately give way. From this type of transportation we cannot hope for present relief. On the contrary, part of their load may soon have to be taken over by city rapid transit lines.

A little consideration will show that subways cost per mile of single track thirty-five times as much as a bus line and can haul only seven times as many passengers per hour. This would seem a strong argument for buses. To try to haul a full subway load, however, on a bus system requires seven lines of buses in each direction, or a street twice as wide as Fifth Avenue at Forty-second Street. The cost of widening such a street would be fabulous and far more than the cost of a subway.

This simply illustrates by a comparison of extremes that each type of transit has a peculiar field of its own, and if we attempt to handle bus travel on a subway we

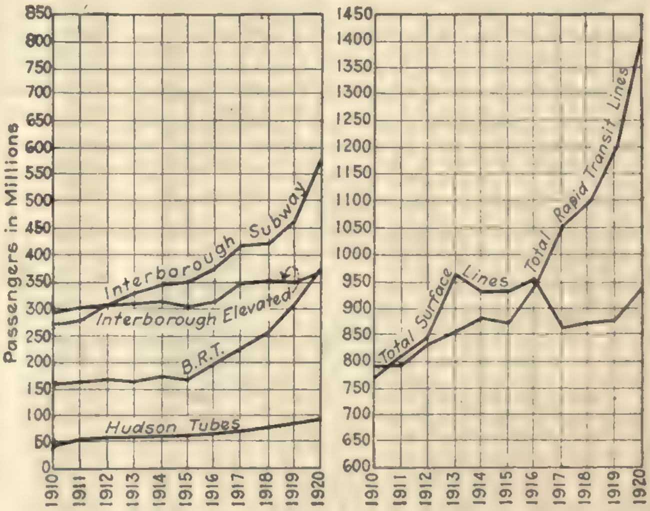


FIG. 6—PASSENGER TRAFFIC IN GREATER NEW YORK FOR PAST ELEVEN YEARS

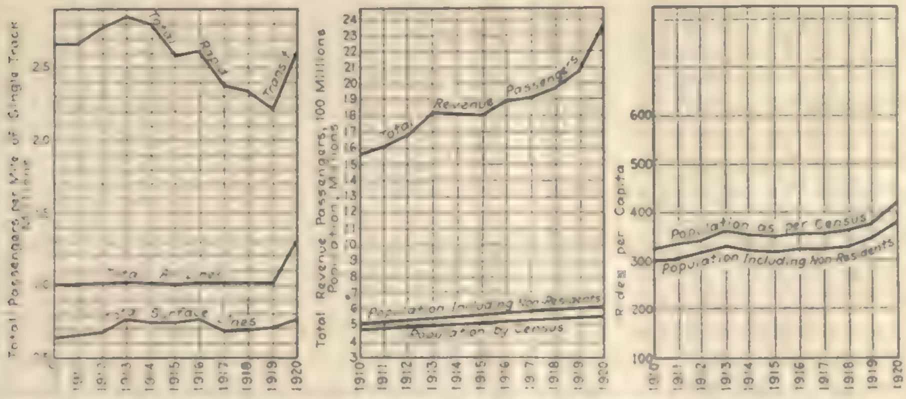


FIG. 7—LEFT-HAND CHART SHOWS TOTAL PASSENGERS PER MILE OF SINGLE TRACK IN NEW YORK CITY, MIDDLE CHART SHOWS TOTAL REVENUE PASSENGERS AND POPULATION OF NEW YORK CITY, CHART AT RIGHT REVENUE RIDES PER CAPITA IN NEW YORK CITY. STATISTICS ARE GIVEN FOR THE PAST ELEVEN YEARS

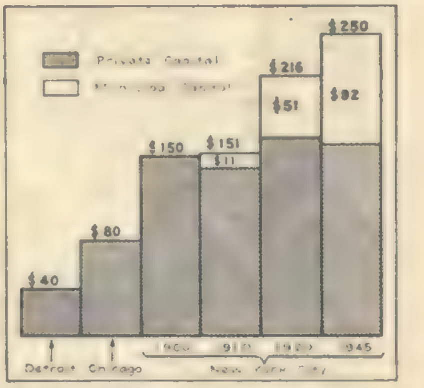


FIG. 8—INVESTMENT IN TRANSPORTATION FACILITIES PER CAPITA OF POPULATION FOR DETROIT, FOR CHICAGO, AND FOR NEW YORK, EXISTING AND PROPOSED

will be just as wrong as to attempt to carry subway long-haul crowds on buses.

GROWTH OF DIFFERENT TYPES OF TRANSPORTATION IN GREATER NEW YORK

During the past ten years the miles of single track have doubled on the rapid transit system of Greater New York. The surface lines have increased their trackage only 5 per cent. This is explained by the great rapid transit program which has been put through in this time. As a result the rapid transit lines have taken practically all the passenger increase during this period and hence have produced an unusual division of travel as between different types of equipment.

The fact is that taking the whole district into consideration the best service to the public can be obtained by a unified co-ordinated system in which each type of transportation will function to the best advantage and as part of a well balanced whole.

This is a pretty big order, but as compared to the process of disintegration and dismemberment which is now taking place it is plainly the right direction in which to work.

The nearer we can approach to a single system distributing its load among its constituent parts in the most effective way for both service and economy the nearer we will attain to 100 per cent economy and 100 per cent service.

More subways are of course inevitable, but let us build them as long-haul trunks and feed them with surface lines and buses. Thirty-five per cent of the passengers in the Metropolitan District use surface electric cars today because they are the most convenient. A study of the needs of the Metropolitan District as a whole suggests a necessity for a combined system cheap enough in its outlying sections to permit of wide distribution of travel. If the engineers can put out such a plan then it will be up to the lawyers, city officials and bankers to solve their part of the Metropolitan transportation problem.

FINANCIAL SITUATION

Accompanying chart, Fig. 8, is made up as illustrating the tendency of cost of transportation in the Greater New York district to increase more rapidly than the population. In other words, the cost per capita has an alarming upward tendency. This tendency is of course inevitable when we go into the period of city development requiring such expensive means of transit as subways. The desirability of carefully canvassing the possibility of utilizing the cheaper forms of surface and bus transit is obvious.

The chart also shows the great preponderance of private investment, so called, which is subject for thought. The comparison of smaller cities is also interesting. Detroit with about one million population and nothing but surface cars has a per capita investment of $40. Chicago with an elevated railway rapid transit system and a very extended surface car system shows $80 investment per capita. New York with its subways doubles this latter figure and seems headed higher.

THE POLITICAL QUESTION

We have analyzed here together the physical, the operating and the financial features of this subject, but I have purposely omitted mentioning the one great stumbling block in the way of a logical, sane solution of this Metropolitan problem, the political question.

Right down the center of the Hudson River we have an artificial political Chinese wall, the boundary between the State of New York and the State of New Jersey. Almost one hundred years ago an engineer designed a steamboat that could plow right across this Chinese wall on the surface of the Hudson. More recently engineers have built railway tunnels under this wall and river, and today engineers stand ready to build bridges over this wall and across the Hudson River.

As an engineer, let me point out to our political friends how this Chinese wall can be finally and forever removed. Let us add a forty-ninth state to the union and name it the State of Manhattan. Let it include the New York Metropolitan District as a single sovereign state; let us leave New York City, Jersey City, Newark, each with its own mayor, its own local government; but let us place matters of common interest to the whole Metropolitan area, such as transportation, water, sewerage and port development, in the hands of a governmental body representing the people of all Metropolitan New York.

Discussion on Mr. Brinckerhoff's Paper

THE first speaker to discuss Mr. Brinckerhoff's paper was Daniel L. Turner, chief engineer Transit Construction Commission, New York. He complimented Mr. Brinckerhoff on the presentation of the topic and acknowledged that there was a Metropolitan District, but he declared that there was no metropolitan authority to deal with the problem from such a standpoint. Until such an authority was established, the problem had to be met of the increasing transit needs of New York City. Mr. Turner then outlined the main features of his recent recommendations, designed to accommodate the traffic growth of the city within the next twenty-five years and based on the following principles:

1. That rapid transit lines should precede the population—not follow it.

2. That a prospective passenger should not be required to walk a much greater distance than half a mile to reach a rapid transit line routing toward the business center.

3. That all transit lines should enter and traverse the center and thus afford the same degree of accessibility to it.

4. That the transit plan should form the real basis for the city plan.

5. That the question of obtaining sufficient revenue to produce a direct profit upon the entire cost was a secondary matter—the indirect profit which would accrue to the city was assumed to be the most important consideration.

These principles, in Mr. Turner's opinion, mean that municipal passenger transportation is a public function —not a business proposition.

His "comprehensive" plan would increase the existing rapid transit mileage by 830 single-track miles and in twenty-five years approximately 5,000,000,000 passengers per year must be accommodated in the city's traffic, most of them on rapid transit lines. This means that enough new rapid transit lines must be constructed to serve about 2,600,000,000 more passengers.

Based on this traffic requirement, the twenty-five-year building program which has been developed (1) provides for approximately fifteen separate extensions to the existing lines; (2) furnishes two new four-track trunk line subways (both double-story subways) traversing Manhattan north and south through the center, one on the East Side, the other on the West Side; (3) includes three moving platform subways crossing Manhattan east and west through the center; (4) adds six single-track tunnel crossings connecting Manhattan with Brooklyn and with Richmond; (5) increases the existing rapid transit mileage by 200 single-track miles, and (6) assumes that the maximum capacity of the existing facilities, which advances in the art demonstrate to be practicable, will be developed by reconstruction and by new equipment.

The construction cost of the new lines, at present prices, will approximate $350,000,000, plus $90,000,000 for interest, administration, engineering and superintendence during the period of construction. This means an annual expenditure of about $20,000,000. The twenty-five-year cost for equipment would amount to about $260,000,000.

Mr. Turner declared himself in favor of public ownership and private operation, as at present, for carrying out this program. He then pointed out that there are two ways in which the money may be obtained, as follows:

1. Assuming a "give and take" modification of the dual contracts, the fare could be increased enough so as immediately to take care of all fixed charges, and thus secure the exemption from the debt limit of the existing rapid transit bonds. This would make available the necessary funds to an amount of $270,000,000. Additional exemptions would make more money available as new lines became self-supporting. Under this arrangement the entire burden of municipal transportation would be imposed on the passenger, although the public at large as a community benefits from adequate transit service as much as the passenger as an individual does. For this reason it does not seem to him equitable to impose the whole burden upon the passenger.

2. The new construction funds needed may be obtained by taxation, the necessary cost each year being assessed against the enhancement in value of city real estate. This would assess the construction cost against those chiefly benefiting. Under this plan, the building program could be financed without imposing any large burden upon the real estate holders of the city and would only be making use of a very small portion of the increase in value which the city has produced. The money for equipment should be furnished by the operator, and the revenue from the passenger fares should amortize it. Then the public at large, as a community, would pay the construction cost, and the passengers, as individuals, would pay the operating expenses and the equipment cost. This, the speaker declared, was the most equitable arrangement and the one he favored.

DISCUSSION BY J. V. DAVIES

The next speaker was J. V. Davies, of Jacobs & Davies, Inc., consulting engineers, New York, who pointed out that suburban traffic of today may be urban traffic of tomorrow. This illustrates the absurdity of running a large number of rapid transit lines to the city limits and stopping them at those points. The suburban railroads, he declared, are not equipped for, nor are they the proper means to fulfill, the function of conducting urban transportation. These roads have other uses and necessities for their terminal facilities than to carry on urban transportation.

In speaking of New Jersey, Mr. Davies pointed out that its transportation needs had been ignored by the New York transit authorities on account of the political and fiscal boundaries, yet he pointed out the recommendation of the commission that future connections with Staten Island should be made by way of Hudson County. He queried how the Public Service Commission contemplated building and operating such a line and whether passengers from Bayonne and Jersey City would be accepted.

He then described the development of the Hudson & Manhattan Railroad, which in less than two years after it began operations had developed more traffic between Manhattan and Newark than had been handled between those points by all the railroads serving the territory on their through business. During the past year 21,500,000 through passengers were carried between Manhattan and Newark on this one artery alone. The future in sight for this transportation, in Mr. Davies' opinion, is a reproduction of this joint service over the Pennsylvania and Hudson & Manhattan railroads but applied to the other great arteries of suburban service. Connection through from Hudson & Manhattan terminals to points on the eastern side of Bergen Hill would enable the suburban traffic operated over the steam railroads to be intercepted in the same way that traffic is now handled at Manhattan Transfer with the Pennsylvania Railroad and that traffic delivered through into the city of New York. However desirable and necessary such connections may be, the amount of money needed for the construction and equipment of such lines will be enormous. The Hudson & Manhattan Railroad, even with its increased fare, can hardly afford to make them. At the same time such facilities are of vital importance to the steam railroads as they are up to the limit of their capacity now for through passenger and freight business and ought not to be called upon to devote any more of their terminal facilities and irreplaceable waterfront properties to their suburban passenger business.

In discussing the Brooklyn situation, Mr. Davies pointed out that there were some inconsistencies in the plan presented by the Transit Construction Commission. Thus, there are statements indicating the desirability for developing community centers, but the plan projects every line of traffic for now and for the future, into or through the congested section of the Borough of Manhattan. The speaker said that the New Jersey example showed the advantages of the distribution of community centers. Indeed, he doubted whether, when transportation systems were planned, it would not be better to check and retard the riding habit of the people by the building up of community centers over the territory as this would lessen the extraordinary growth in recent years in the riding habit.

Such community centers would have their own homes, places of amusement, markets, factories, offices and business, so that those resident within the community would not be under the constant necessity of spending hours each day riding to and fro to carry on their business. The Brooklyn Rapid Transit Company had urged the construction of some lines which would tend to serve Brooklyn in this way, but it had never received the favor of the commission.

DISCUSSION BY GEORGE MCANENY

George McAneny, formerly president of the Board of Aldermen, New York City, was the next speaker. Referring to Mr. Brinckerhoff's paper, he said that the author had put his finger on the vital points in the New York transportation problem. The consideration of the Metropolitan section as a whole is ideal, but there are difficulties in the way. These must be overcome by patient efforts, which will take time. If the business and industrial interests on both sides of the Hudson River will accept the fundamental principles outlined, much can be accomplished.

Recent developments have shown that the State of New Jersey is alive to its community of interest with New York City, because joint consideration is being given to such matters as sewerage, the development of the port and the vehicular tunnels. In New York City the "City Fathers" have at least considered the desirability of getting the mayors of the cities interested to meet and consider their common problems. The fact that so many hundreds of thousands of people come into New York from outside the city daily makes this very desirable. A joint commission might well be appointed to consider the whole situation.

Meanwhile, the city must continue to develop in its own way, although co-operation will help. As to the rapid transit lines, the dual system first applied the radial idea and invited the development of new community centers. This in part corrected the tendency toward concentration at the lower end of Manhattan Island.

The degree of concentration already attained is indicated by the fact that if all the buildings south of Chambers Street on Manhattan Island were emptied at once, the people in the street would be five deep from building line to building line. The original Interborough Rapid Transit line could not carry off the population of the Woolworth Building in less than one hour. Concentration brought about an impossible condition, so that lines were laid out to take people away from the congestion center, some going into such sparsely settled regions as to be nicknamed "cornfield lines."

Mr. McAneny expressed approval of Mr. Turner's scheme for developing the rapid transit system, but would have liked more cross lines, giving the plan more of the appearance of patchwork.

A practical difficulty in the way of rapid transit expansion is a financial one. Until the $270,000,000 already invested is removed from under the debt limit, due to the subways becoming self-supporting, financing problems will be acute. However, the engineers should keep on planning for the future.

DISCUSSION BY FRANK HEDLEY

Frank Hedley, president Interborough Rapid Transit Company, pointed out that New York City is already committed to public ownership of subway rapid transit lines and has used a substantial amount of its credit to build them. Hence, it was difficult to see where the city credit would ever be used to construct lines that would build up territory in New Jersey, especially when within the present limits of New York City there were many acres of vacant or undeveloped land. The policy of the city has been to have a single, uniform car fare within its boundaries because it encouraged the building up of the undeveloped areas.

The city of New York and the rapid transit lines are partners in business and they should both work together to make the transportation for the people satisfactory and sufficient. Public officials and representatives of the operating company must co-operate and work together with the view of making a success out of the enterprise, for the investing public will not put new money into railroad lines unless they are assured of fair and decent treatment on the part of public officials and a return on the capital invested.

DISCUSSION BY FRANK J. SPRAGUE

Accord with Mr. Brinckerhoff's general point of view was voiced by Frank J. Sprague, consulting engineer, New York, who said that a development which ignores the great railway and residential territory to the westward of Manhattan, and which unduly intensifies localized routes and trackage, will invariably increase congestion, with all its attendant grave dangers. In his opinion it would be better to force a distribution of business activities instead of making rapid transit lines, which by their very existence build up traffic, unnecessarily tributary to concentration of real estate activities.

Mr. Sprague declared that the present system of three rapid transit lines was far from ideal, each being laid out with an eye to its own advantage, largely regardless of the city's needs. Even now, when there should be a whole-souled attempt by every public official to plan the future with an eye single to the good of the city, personal ambitions stand as a bar to constructive effort, while transportation is made the football of politics.

There is only one logical and sound method of development. It must begin with unity, which means that not a single foot of unnecessary trackage shall be laid down, but that a single system shall be developed without the introduction of engineering handicaps which will prevent whatever additions may be necessary in the future, and that all trackage shall be used to its limit. The basis of such a development are longitudinals on Manhattan Island on one level, with such loops and terminal extensions as may be necessary, but with transverse routes on a different level, some local to Manhattan and others reaching into the heart of the territory to the east and west. Transfer of passengers should be via double-level stations, stairway connected at the junction points of the routes. This plan would make it possible to add longitudinals and transverses at will, while maintaining the maximum possible facility of movement as a whole, and if there were a fair basis of transfer with surface lines, car and bus, much of the short-haul underground traffic would be eliminated and these lines be more available for cross-river transportation. Almost every one seems to look at the rapid transit problem on the basis of the requirements of hours of morning and evening business traffic, forgetting that facility of traffic to and from a limited area induces greater concentration of business buildings and employment in congested localities, whereas the better decision is to help make such localization of activities unnecessary.

Mr. Sprague then recommended for the operation of such rapid transit lines cars of the largest practicable size and carrying capacity, arranged for the most rapid loading and unloading and with a motor on every axle.

DISCUSSION BY L. B. STILLWELL

L. B. Stillwell, consulting engineer, New York, sent a contribution which was read by Col. F. A. Molitor. It described particularly a new type of moving platform proposed for the crosstown services on Fourteenth Street, Forty-second and Fifty-seventh Streets. The three elements will move respectively at 3, 6 and 9 m.p.h. with working widths respectively of 27 in., 27 in. and 57 in. The third platform carries seats for two passengers seated side by side, the seats occupying 36 in. of the platform width, while the remaining 21 in. is reserved as a walk or passageway. The seated capacity of the platform, therefore, is 31,680 passengers an hour in each direction.

The 3-mile and 6-mile elements of the platform will each consist of a continuous train of cars approximately 12 ft. long and 28 in. wide, each car comprising a channel arch steel plate filled with agasote with an anti-slip tread of the length and width named and approximately 1½ in. in thickness, resting at one end upon a two-wheel truck or bogie equipped with wheels provided with ball bearings and running upon suitable rails in a track of 18-in. gage. The other end of the 12-ft. plate will be supported by the truck attached to the next adjacent car or unit of the platform element to which it will be connected by a bolt or king pin, permitting each car to take its proper position in rounding a curve. The high-speed platform overlaps the medium-speed platform and the medium-speed platform overlaps the low-speed platform. To secure the difference in elevation of the different platforms, 6-in. wheels are used on the low-speed, 7-in. on the medium-speed, and 8-in. wheels on the high-speed platform.

The system of propulsion comprises the elements of an alternating-current induction motor, but the circular form is abandoned and the secondary, consisting of the usual steel laminæ and short-circuited windings which need not be insulated, is extended horizontally and suspended beneath the truck directly above the center of the track.

The primary elements, each consisting of steel laminæ rigidly supported by a suitable casting, the upper face of the assembled laminæ being in the same horizontal plane, have insulated windings supplied through suitable circuits with three-phase alternating current. The clearance between the upper face of the primary elements thus assembled and the lower face of the continuous secondary carried by the moving platform is approximately 3/16 in. The primaries being energized by currents supplied thereto from the source of power, currents are induced in the windings of the continuous secondary and the elements of the platform to which it is connected are moved by continuous and progressive magnetic attraction and repulsion. The elements of this system, Mr. Stillwell declared, have been subjected to thorough tests upon a commercial scale and there is no question that it will function as intended. The primaries are spaced beneath each element at distances depending upon the speed and therefore upon the energy required. In the case of the 3-mile platform the primaries will be approximately 400 ft. apart, in the case of the 6-mile platform 200 ft., and in the case of the 9-mile platform 60 ft. apart.

Mechanically, Mr. Stillwell said, this system is obviously ideal. Simplicity of design and construction can go no farther. From the electrical standpoint, the comparatively large air gap implies a rather low power factor, but the energy required for the operation of the platform is so little that the increase in electrical losses due to low power factor is negligible. The weight of the moving platform (all elements) per seated passenger is less than 400 lb., while that of a subway motor car is about 1,800 lb. It is estimated that the moving platform 10,500 ft. in length which has been proposed for installation on Forty-second Street will require for its operation less than 300 kw., say about 3,000,000 kw.-hr. per annum.

DISCUSSION BY DR. WILCOX

Dr. Delos F. Wilcox, the next speaker, made a plea for municipal ownership and operation of the transit properties. In doing so he declared that the demands made by private capital at the present moment as the price of embarking upon electric railway enterprises puts the use of private credit as the principal source of capital for the extension and equipment of future rapid transit lines quite beyond the pale of serious discussion. He explained that in taking this position he did not mean that the job of operating the unified transportation facilities of the Metropolitan District should be thrown at the head of Mayor Hylan or of Public Service Commissioner Barrett some fine morning without any preparation on the part of the community or on the part of these officials to make their successful performance of this function possible. He did not assume either that public operation means the discharge at the outset of every transportation man who has learned his job in the school of experience, whether as manager or as motorman, and the recruiting of an entirely new personnel from the ranks of those who are profoundly ignorant and inexperienced in transportation matters. His reasons for favoring public operation may be summarized as follows:

1. Local transportation in a great urban community has come to be recognized as a public function; that is to say, the service rendered and the rates charged

ought to be determined primarily on the basis of public need, not upon the requirements of private profit. This does not imply that in any particular instance the service should be rendered free or below cost, but it does imply that the extent and quality of the service and the rates charged for it shall be controlled ultimately by social considerations growing out of the community's policy of self-help and self-government.

2. The state commission plan involves the assumption by the regulatory authority of so great a responsibility for service, rates, financial policy and methods of operation with respect to the street railways under commission jurisdiction as to make the proper exercise of the regulatory function more difficult, in his opinion, than the efficient operation of the transit lines through a direct public agency. All of the dangers of ignorance, political pull and inefficiency which the opponents of public operation foresee as incidental to the adoption of that policy already beset the exercise of the regulatory power through commissions. Yet, so vital is the public interest in the operation of urban transit facilities that no one at this stage of municipal evolution seriously proposes that the hand of public regulation shall be withdrawn from the transit lines. In this matter a backward step is impossible.

3. As a means of protecting the private investments in transportation facilities, and as a means of procuring a readier response to the transportation needs of the community, the service-at-cost plan has been devised. Yet this plan, and state regulation as well, logically carried out, cut the heart out of the motive upon which the success of private operation and its alleged superiority over public operation are supposed to depend. The result is that private enterprise is paralyzed, while public initiative seeks to accomplish through indirect and circuitous methods the things which could be more easily accomplished directly.

4. The vital importance of transportation facilities increases with the increase in area and population of the urban community concerned. The very social and economic life of the community depends upon continuity of service. This means that more and more the function of fixing wages and the hours and conditions of service in the public transportation business is recognized as a function to be performed through some public agency. This involves another important encroachment upon the field of private operation.

Continuing, Dr. Wilcox said that when we consider that construction, equipment, the issuance of securities, the rates charged, the service rendered, the expenses incurred and the labor policy followed are all inevitably being brought under public control, it is obvious that those who oppose public operation on principle base their argument on assumptions that are now quite out of date. Moreover, the public cannot and will not permit the transportation service of a great community to be operated by private agencies under terms that will make successful private operation possible under present conditions or under conditions that will hereafter prevail. The job is too big and too important for any agency less than the municipality itself to handle.

DISCUSSION BY O. B. WILLCOX

The next speaker, O. B. Willcox, vice-president Bonbright & Company, bankers, New York, took the position that the development of rapid transit in New York should be under private ownership and operation, and as nearly as possible brought under one control and direction. Private construction, ownership and operation of utilities, he said, require such earnings as will not only pay charges and a fair return on the capital invested but also attract new money for expansion. The permissible rate of return has a dual function—the protection of the existing investment and the attraction of new money for expansion. The function of regulation of utilities in the public interest is to create such conditions as will provide adequate and efficient public service. This means that it must provide such conditions as will attract capital for expansion through the purchase of not only bonds and other fixed obligations but also the corporate stocks of the enterprises.

Government or municipal ownership and operation of public utilities are not desirable in the public interest and, measured by economic and financial standards, have not been successful. The field of politics; that is, of government, is mainly the regulation of conduct and the protection of rights. The field of economics is the production and utilization of material things. Utilities are economic and financial enterprises. Politics or government ownership does not approach the problem with the economic outlook and invariably has resulted in failure. The principal advantage claimed for public ownership, that new money can be raised more cheaply on public credit than on private corporate credit, would largely disappear if municipal securities become subject to taxation, as is now widely urged.

Mr. Willcox said he could not agree with the conclusion of one of the earlier speakers that private operation of utilities in America has been a failure. On the contrary, in provision of adequate service at reasonable rates for the convenience of the public and for the development of industry, lowering the costs of production and in every measure of successful service, privately owned and operated utilities in America have been a pronounced success. In many cases they have been limited in their usefulness and in their ability to expand and to provide the best service and to reduce further the costs of production through the application of labor-saving devices by the failure of public regulation to permit such earnings as would establish the financial conditions and credit necessary for the attraction of capital to continue expansion.

Referring to the New York situation, Mr. Willcox declared that the public interest required: (a) A fare that will pay charges and sinking fund on city money invested, as well as a return on private capital invested, and (b) a fare that will give the operating companies such credit as will attract new money for required expansion through the purchase by investors of the company's securities.

Mr. Willcox then raised the point of the desirability of the concentration of population in cities, which, he said, was encouraged by local utilities of all kinds, as these utilities provided, as compared with smaller communities, cheaper living in relation to income and opportunity and easier, softer and pleasanter living conditions. A survey might show the economic limit of population of cities without such transportation and public service facilities at perhaps 1,000,000 or 2,000,000. This is about the population of the great and old cities of Constantinople, Calcutta and Pekin, and many others, all located with comparable natural advantages and in countries of much denser population. But in a modern city provided with ample transportation and other public utility service this same economic limit does not exist.

Continuing, Mr. Willcox said that while it is true that large cities create and offer opportunities to individuals, there does not seem at a cursory glance to be any decided advantage to the body politic, to the interest of the public as distinguished from the interest of individuals, in such artificial concentration of population. Its disadvantages are obvious. There is enormous economic waste in the transportation of large numbers of people long distances from home to work, often in both directions; in transporting and distributing water, food, fuel and other necessities, and in the overcrowding itself, which conceivably could become so great that eventually workers would be in each other's way or could not all find room on the city's streets. Such congestion is accompanied by great perils, as from contagion and epidemics, from famine and failure of essential supplies, from fire, panics and war, and notably from strikes, the entire population being at the mercy of a number of small fractions of the population engaged in purveying necessities. These disadvantages and perils must increase with increasing concentration, obviously in some unknown ratio to the population. Whether the increase of New York's population is largely artificial, not brought about by natural causes, but stimulated and made possible by all kinds of utility service, and particularly the rapid transit systems, is a question worthy of scientific survey and study.

The most conspicuous feature of New York's rapid transit systems brought out clearly by Mr. Brinckerhoff's discussion, as well as in the report of Mr. Turner, is the delivery of an enormous number of passengers daily from the outlying parts of the Metropolitan District to the heart of the city of New York below Fifty-ninth Street, and the resulting concentration on Manhattan Island of tremendous business activities in financial, manufacturing amusement and other enterprises. Without its rapid transit system the same population in the Metropolitan District, assembled in a number of communities, self-contained and adequate in provision for all social and business activities, might and doubtless could accomplish the same production and it may well be without the economic waste and loss and without the perils of the present and the progressive daily congestion in Manhattan Island.

Should the tendency to congestion in Manhattan be checked and can it be checked? Economists have sought in vain for some means to discourage the growth of cities at the expense of the rural districts so that the supplies of raw materials out of the earth may keep pace without excessive cost with the increase in the world's population. If it be true that the enormous growth of such cities as New York results not from natural causes but from artificial conditions such as rapid transit and other public utility service, permitting and inviting congestion, then perhaps some artificial checks to concentration must be found. Thus, it is conceivable that an increase in the cost of local transportation would operate as such a check, and indeed that it may be necessary in the public interest that such a check be established against the increasing tendency to concentration of population in such great centers.

In New York an increase of local rapid transit fares to 10 cents would probably not check congestion; it would, however, give the operating companies better credit for necessary expansion, besides greatly improving the city's credit position. A gradual rise in rapid transit fares above 10 cents must eventually meet a point where unnecessary traveling would cease and local centers would develop, self-contained, more economically supplied with necessities, safer in the assurance of a continuous supply of water, fuel, food and the like, and where work could be found near home, obviating many of the dangers and perils of great and increasing congestion; existing rapid transit might be sufficient for necessary travel between the several community centers of the Metropolitan District; a rapid increase in rapid transit facilities would probably be unnecessary; the further growth of the city would continue in and about the new centers without loss of economic capacity and political, financial and industrial power of the Metropolitan District; manufacturing could find sites and labor within walking distance not drawn away by cheap transit fares to the excitements of intense concentrated city life, and saner and more natural conditions should prevail in all the relations of life.

Engineers, Mr. Willcox concluded, may very well study not only how New York's transportation can be expanded with the inevitable growth of population of the city at the expense of the country and also the inevitable congestion in the heart of the city, but also the data on which some opinion may be formed as to whether the advantages or disadvantages of such congestion preponderate; whether we should seek a sound way to check this growth or continue to expand the population of the city through the expansion of its utility and rapid transit facilities.

DISCUSSION BY MR. PARSONS

R. S. Parsons, general manager Erie Railroad, took up the discussion of transportation in the Metropolitan District from the standpoint of New Jersey. He said that this State should awaken to its rights in the matter. The New Jersey section of the district contains fifty small municipalities, more or less, and if these would unite, they could exert a powerful influence. Stretched along the Hudson from Bayonne to Fort Lee are ten of these municipalities.

As to the relation of the steam roads to local transportation, Mr. Parsons said that the steam roads were never built for suburban business. Their function is long-haul passenger and freight traffic. At first they naturally took on suburban business for the reason that when lines were installed for freight and through passenger service they could serve commuters at low rates of fare with profit to themselves. However, this resulted in the opening up of communities which in time became powerful enough to demand increased service. This was unprofitable, but it has been impossible to increase commutation rates sufficiently to make them remunerative.

Referring to the local situation, Mr. Parsons said that the only thing that has prevented expansion west of New York City is the state boundary, but, like Mr. McAneny, he saw signs of co-operation which might in time eliminate this obstacle.

One thing urgently needed locally is a bridge across the Hudson River at 125th Street, a physical connection between two important sections which would assist in eliminating one of the main obstacles to good suburban traffic. This is the reluctance of passengers to change from one transportation agency to another. The steam railroad terminals in Jersey City and Hoboken are greatly overcrowded. Suburban traffic must be removed from them as much as possible. One suggested plan is the placing of a large union terminal in the Hackensack Meadows to serve as a terminal for the suburban traffic now taken to Jersey City, Hoboken and Weehawken on the various steam railroads, with a moving sidewalk connection to and across New York City.

DISCUSSION BY MR. WOODWARD

P. H. Woodward, general passenger agent Long Island Railroad, the next speaker, first quoted statistics on passengers in and out of New York during 1919 as follows:

PASSENGERS HANDLED IN AND OUT OF NEW YORK CITY

Long Island Railroad Three terminals: Pennsylvania Station, Flatbush Avenue (Brooklyn), and Long Island City. To and from subway and elevated lines at Woodside and Hunters Point Avenue	48,786,000
New York Central	25,361,499
New York, New Haven & Hartford	14,886,158
Pennsylvania Railroad	13,940,000
Central Railroad of New Jersey	16,720,600
Delaware, Lackawanna & Western Railroad	20,400,000
Erie Railroad	25,116,849
New York, Westchester & Boston Railroad	3,750,806
New York, Ontario & Western Railroad	538,692
Lehigh Valley Railroad	408,000
Baltimore & Ohio Railroad	510,000

The Pennsylvania Railroad, in addition to the 13,940,000 passengers carried in and out of the Pennsylvania Station and the ferry terminals at Cortlandt and Desbrosses Streets, handled during 1919 4,420,000 passengers at its Jersey City Terminal and transferred to and from the Hudson & Manhattan Railroad at Manhattan Transfer a total of 22,640,000. This would make a grand total for the Pennsylvania of 41,000,000 passengers. The Staten Island Rapid Transit handled on Staten Island a total of 10,205,000.

It is estimated that 50 per cent of the passengers of the Delaware, Lackawanna & Western Railroad transferred to and from the Hudson tubes at Hoboken, and that 60 per cent of the passengers of the Erie Railroad transferred to and from the Hudson tubes in Jersey City. The Hudson & Manhattan Railroad handled 92,571,928 passengers during that year.

A summation of these figures, after duplications are deducted, show for the roads mentioned a total during 1919 of more than 250,000,000 passengers. In 1920, if all of the lines enumerated showed the same increase as the Long Island, or 14 per cent, the total would be 285,000,000. This compares with the rapid transit systems for 1919 as follows:

Interborough:	
Subway	529,471,097
Elevated	348,577,398
Total	878,048,495
Brooklyn Rapid Transit	726,738,213

Of course all of the passengers handled by the steam roads are not daily commuters, but this traffic is growing enormously, yet this short-haul traffic blocks terminals and hinders the expeditious handling of through passengers, to say nothing of the congestion it causes to freight traffic. This situation presents an economic problem hard to solve. A steam road, such as the Long Island, cannot adjust its rates so as to make ends meet, due to this short-haul traffic that is continually demanding lower fares, which today are unremunerative. The terminal cost alone to handle a passenger is more than a standard subway or elevated fare.

Another thing to consider, according to Mr. Woodward, is that when the steam roads introduced the cheap rate commutation ticket, they expected to profit by collateral earnings, such as members of families and visitors traveling at a higher rate of fare, freight, express, mail, etc. The elevated and trolley lines, the motor trucks, the delivery to residences from all the department stores have taken away practically all of the collateral earnings outside of coal and building materials, leaving to the railroads only the commuter at a low rate, with nothing to carry the loss, and when the revenues derived from through freight and passenger business are too small to absorb such losses, poor service and slowing down of development is the natural result. Therefore, the remedy for the railroad is to be relieved of this near-by traffic and build up the sections beyond the rapid transit zones.

DISCUSSION BY MR. HARWOOD

George A. Harwood, assistant to the president of the New York Central Railroad, the final speaker, first described the development of the New York & Harlem Railroad from a horse railway to a steam and electric railroad. He agreed with Mr. Brinckerhoff that the most expensive type of transportation for urban and suburban travel within the Metropolitan District is the steam railway. This is due largely to the expensive terminal on highly valuable land, which often results in fixed and operating charges per passenger exceeding the total rate per ride paid by the pasenger, excluding entirely the fixed and operating charges for handling him between the terminal and his destination. The fact that most of this business has to be handled in morning and night peak loads still further adds to the cost of this transportation.

But the financial waste in this business is perhaps not the most serious aspect of the difficulty, because the continued increase in suburban travel ultimately prevents the steam railroad from performing its most important function, namely, providing the long-haul transportation for the city. In the period from 1909 to 1919 there has been an increase of approximately 60 per cent in the number of passengers handled in the Grand Central Terminal and in that same period an increase in suburban travel of over 100 per cent. In 1916 41 per cent of the passengers using the terminal were suburban travelers, and in 1919 56 per cent. As the long-distance travelers want also in general to arrive and depart in the morning and evening, the peak load of this service coincides with that of the suburban service, and it is only a matter of time, and a relatively short time, when a terminal such as the Grand Central, with its elaborate provisions for the separation of suburban and long-distance travelers, will be prevented from delivering the amount of long-distance transportation which the growth of population will require.

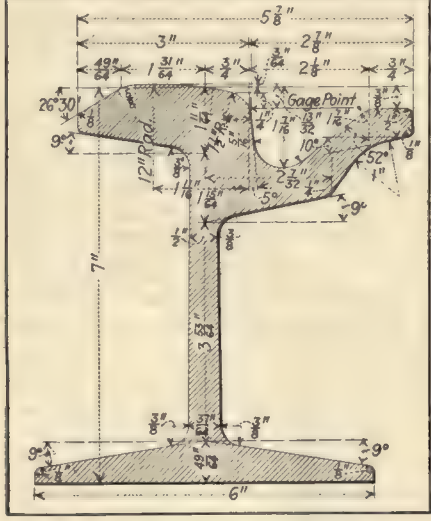
Some relief, Mr. Harwood said, can no doubt be provided by the introduction of transfer stations at outlying points where the railroad may deliver its load of rapid transit passengers to the strictly city lines. Thus, provision has been made in the plans of the New York Central Railroad, in conjunction with the Public Service Commission, for such a transfer point to be located in the vicinity of Mott Haven. This, however, can never solve the substantial part of the problem. It will take care of a portion of the travel going to the more northerly parts of Manhattan Island, but it can probably never be made sufficiently attractive to entice away from his seat the passenger whose destination is Forty-second Street or south thereof.

The solution, therefore, seems to be in the development of the rapid transit system of the city, not only to the city limits but to such distances into Westchester County as may be accommodated within the limits of reasonable running time which such a rapid transit line may provide. Mr. Turner, in his recommendations covering the extension of the present rapid transit system, estimates that such distance is 18 to 20 miles from the center of the city, providing sufficient tracks are constructed so that express service is permissible, but with improvements in the art it may not be unreasonable to suggest that these extensions ultimately should go to distances of 22 to 30 miles. Such initial extensions would enormously benefit the present situation. In conclusion, Mr. Harwood made definite recommendations in regard to certain of the routes proposed by the Transit Commission.

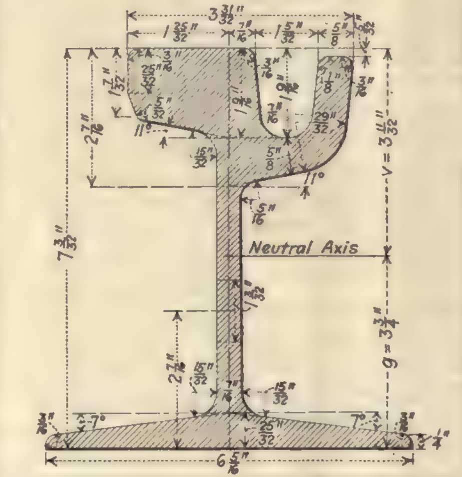
Two Recent Foreign Standard Rail Sections

New Australian and French Standards Are in Opposition as to the Curved Head—Notable Joint Plate Design

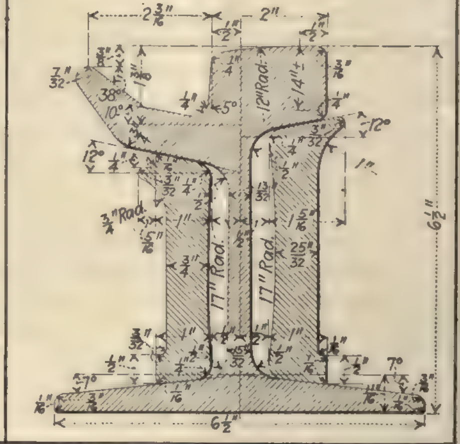
THE conference of electric tramway engineers held in Sydney, N. S. W., during May, 1918, for the purpose of developing a standard girder grooved rail has resulted in the adoption, recently, of the standard rail shown in the drawing herewith. In the issue of this paper for Sept. 21, 1918, the principles laid down for guidance in preparation of the design were published. Notable among these were the agreement that the form of groove and guard of the rail should follow the designs of the American Electric Railway Engineering Association and that the tread of the rail head should be curved or convex.



NEWLY ADOPTED AUSTRALIAN RAIL SECTION



NEW FRENCH STANDARD EMBODIES FLAT HEAD



A. E. R. A. STANDARD 7-IN. GIRDER GROOVED RAIL

The resultant design differs considerably from the American standard, but in the main the principles of the American design are followed. For instance, the tapered web and curved head are adopted, although the curved head does not follow the compound curve recently added to the American standard. The very wide base will be noted. This follows a recent designing principle governing British rails which calls for a width of base substantially equal to the height. The shape and width of the bottom of the groove varies from the American design considerably. The increased width here is to give more room for wheel flanges when the head is worn down.

The width of the head is much less than that of the American rail, but it follows British practice closely. The head width is largely dependent upon the width of the average wheel tread in use and no doubt this suits the Australian wheel conditions.

The design of the joint plates is notable because provision is made in the top edges for electric arc welding by providing places upon which to lay the welding rods.

NEW FRENCH STANDARD GIRDER GROOVED RAIL

The French Light Railways Association has recently adopted the new standard girder grooved rail shown in the illustration. In common with most recent British and other foreign designs the tendency to increase the depth or thickness of the head is noted.

The most striking feature is the return to a horizontal flat tread, in contrast to the combined horizontal and convex tread. In former designs the head surface was level for about half the width from the back of the head toward the gage line, thence leading downward into the groove by means of a curve of about 12 in. radius.

The return of the French standard to a level flat head design is in line with arguments advanced in favor of such a procedure by several British engineers at the recent meeting of the Tramways and Light Railways Association. However, the British engineers do not agree on this by any means and the tendency in Great Britain is toward standardizing upon some form of convex tread. The difficulty in determining upon a standard seems to be that each tramway engineer in the British Isles wants his own particular wear conditions met in the design. Naturally the British standards committee is having trouble in satisfying such claims.

For the purpose of comparison a drawing of the recently revised American standard 7-in. girder grooved rail, which has the new convex tread design, is reproduced.

The Motor Truck Association of America has announced that a highway transportation show will be held in New York City from Jan. 3 to 8, 1921. The show will be held in the Twelfth Regiment Armory, Sixty-second Street and Columbus Avenue, and First Field Artillery Armory, Sixty-eighth Street and Broadway. The combined floor space is about 50,000 sq.ft.

Compromise Joints in Electric Railway Trackwork

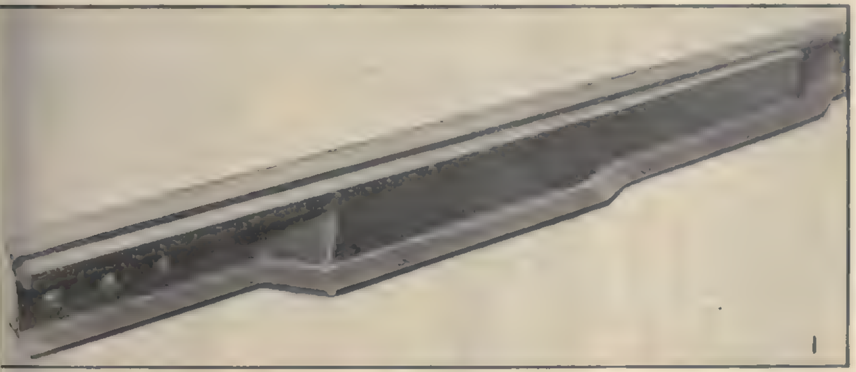
The Author Outlines Some of the Difficulties Which Have to Be Met in Joining Rails of Different Cross Sections and Shows How These Difficulties Have Been Overcome

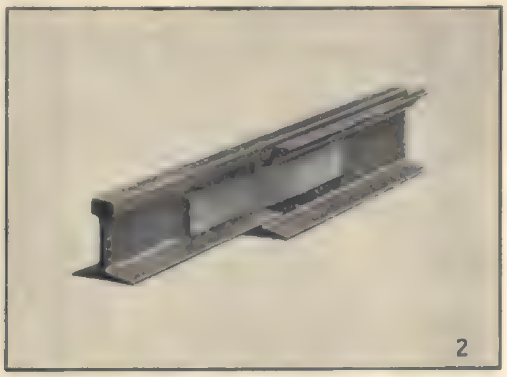
BY R. C. CRAM
Engineer Surface Roadway Brooklyn Rapid Transit Company

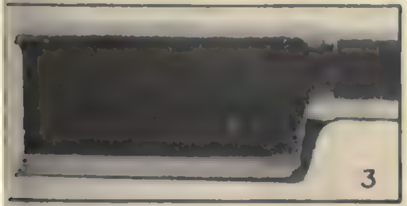
THE joining of two rails of unlike cross section is by no means an easy task and the difficulty in successfully doing so is increased when either one, or both, of the rails is worn. The wear which adds to the trouble can take place in the head surface, in the sides or undersides of the heads and sometimes in the tops of the bases. If we add to these items the contour or sectional differences we have a problem of no mean order when we attempt to make up the joint. It is thought that, in proportion to the number of compromise joints on any one electric railway as compared with regular joints, one of the former will cause more maintenance expense than several hundred of the latter.

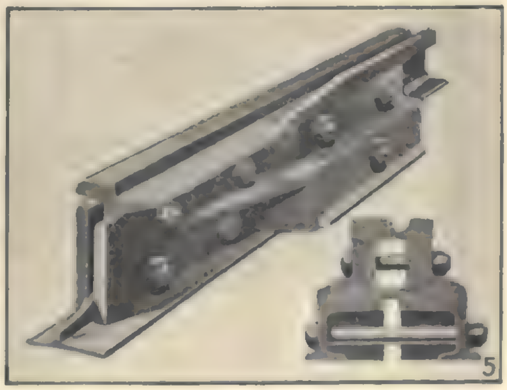
As a matter of fact the joining of two rails of the same cross section (mechanically, at least) has presented a problem which has not yet been solved to the entire satisfaction of track engineers. One of the difficulties lies in the minute differences and discrepancies in the "fishing section," which are found in what appear to be the most perfect of new rails and the angle bars or joints designed to fit them. These differences and discrepancies tend to magnify the compromise joint problem.

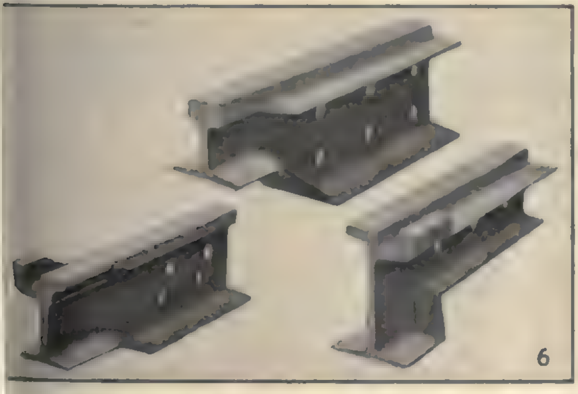
A compromise is an adjustment of differences by mutual concessions, and, since this is just what happens when rails of different sections are joined, the joint plates or splice bars which are used for this purpose are called "compromise" joints. These, by the way, must not be confused with "compromise" rails, to which reference will be made later. Compromise joints are sometimes called "combination joints," "taper joints," or

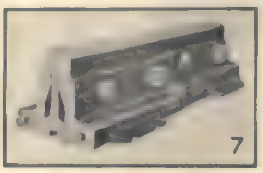












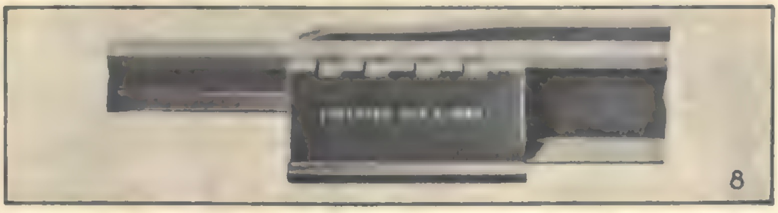
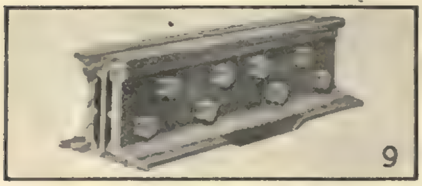


Fig. 1—Cast-steel combination rail.
Fig. 2—Electrically welded combination rail.
Fig. 3—Thermit-welded combination rail.
Fig. 4—One make of cast-welded compromise rail.
Fig. 5—Cast-steel combination joint.
Fig. 6—Cast-steel combination rail.
Fig. 7—Continuous step joint.
Fig. 8—Another make of cast-welded compromise rail.

Several Types of Compromise Joints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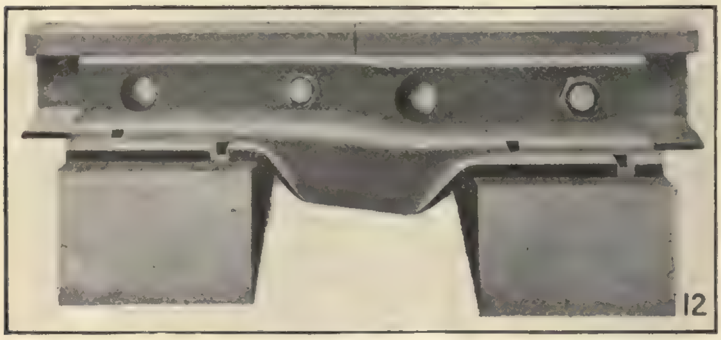
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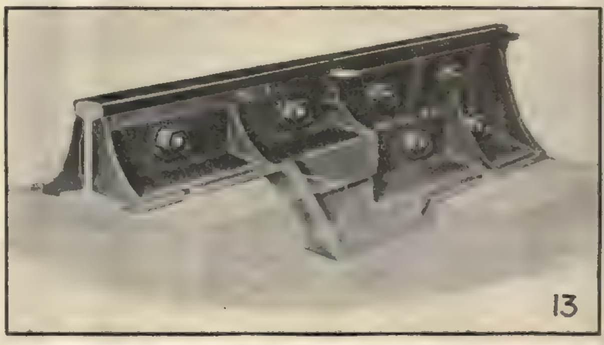
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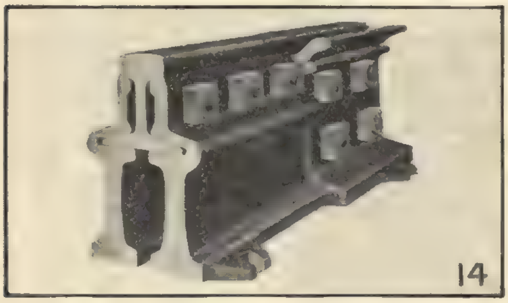
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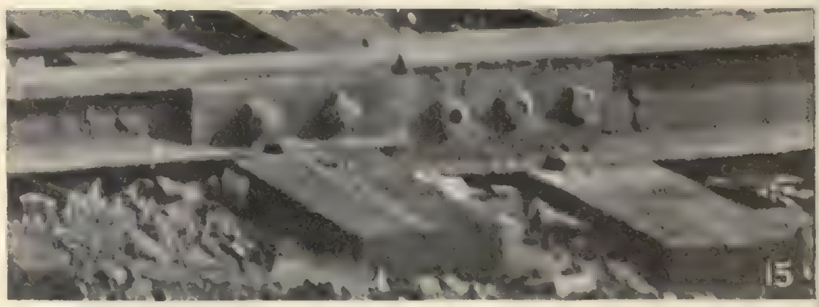
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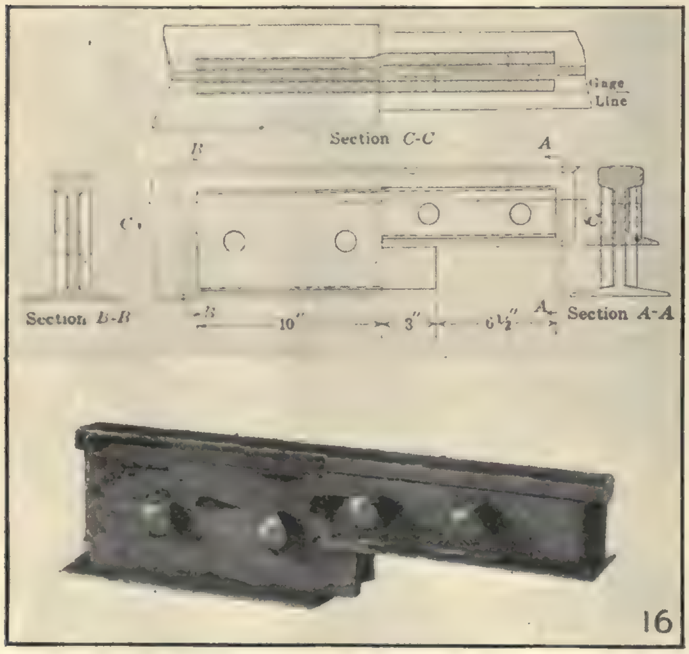

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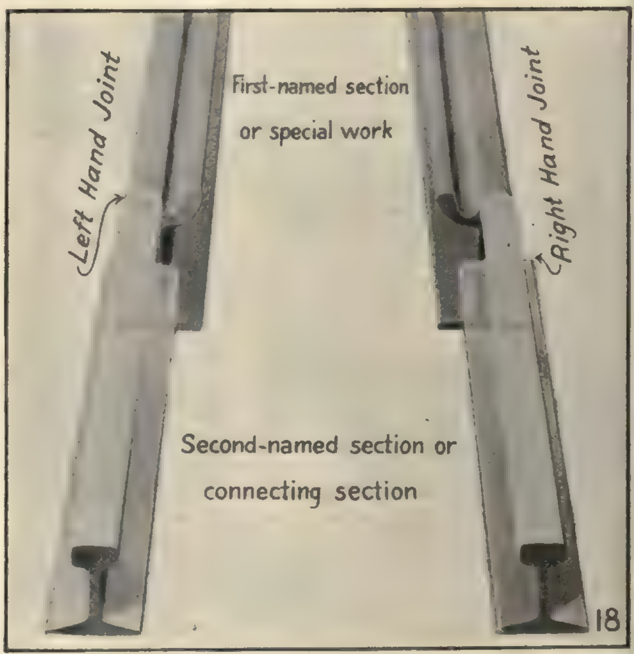
Left Hand Joint
First-named section or special work
Right Hand Joint
Second-named section or connecting section
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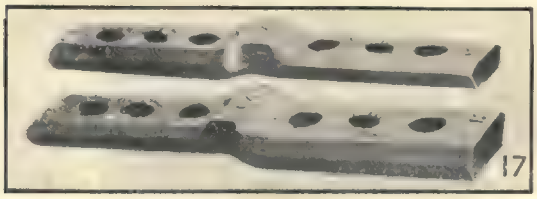
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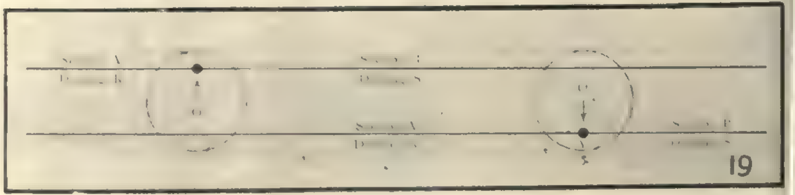
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Fig. 9—Reading cast-steel compromise joint.
Fig. 10—Trasco compromise joint.
Fig. 11—Cast-steel step joint.
Fig. 12—Bonzano rolled-steel step joint.
Fig. 13—Cast-metal step joint.
Fig. 14—Continuous compromise rail joint tee and girder rail.
Fig. 15—R. P. Williams' compromise joint.

Fig. 16—R. A. Willson's compromise joint.

Fig. 17—"Joggle plates," as the British term compromise or step joints.

Fig. 18—Manufacturers' method of determining "hand" of compromise joints.

Fig. 19—A. E. R. E. A. method of designating compromise joints

"step" joints. Our British friends are apt to call them "joggle plates."

Compromise joints are confined mainly to special trackwork, where they are used to connect the guard rails and other special rails used in special trackwork with the adjacent rails in tangent or connecting tracks. Compromise joint troubles have emphasized the desirability of having guard rails "fish" with the rails used in tangent tracks and there is a marked tendency in this direction, which has been accelerated by the efforts of maintenance engineers to adopt rail standards for their systems. It will be noted that the American Electric Railway Engineering Association took good care to provide standard guard rails which would "fish" with the rails which the association adopted for tangent tracks.

There are at least ten different types of compromise joints or means for accomplishing the same purpose which have been used with more or less success. The earliest forms consisted of the regular splice plates or angle bars, upset and offset in the field or in the shop by the blacksmith. With T-rails where the sectional differences were not great, such joints gave fair service provided the smith was good at retempering the bars and had fair skill at reproducing the fishing angles and fairly true surfaces. With a job of connecting a 4-in. T-rail and a 9-in. tram girder rail, however, such a joint has several objections, and is particularly difficult to make even when it takes the forms of special cast steel bars or of bars planed from flat bar steel stock. Nevertheless the old custom of making such joints by cutting and smithing deep plates prevails to a large degree. Although the arc welder and the acetylene welding and cutting torch are more and more coming into use for this purpose, there is little doubt that in many cases the skilled blacksmith will never be entirely supplanted. Mention should be made here of the machine devised by C. H. Clark for upsetting joint plates, which greatly facilitates this sort of work. This device has had its greatest use on overhauling or rehabilitation work on old tracks, where a great number of plates of the same shape require upsetting. This work is quite similar to regular compromise joint work, since plates must be upset and sometimes offset in order to take up wears and head pounds or dishes.

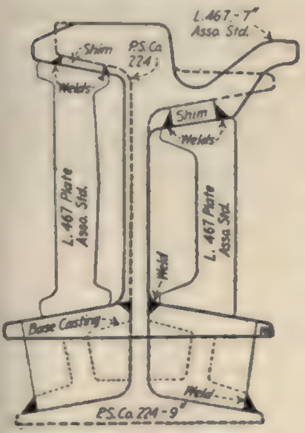


Fig. 20—R. P. Williams' compromise joint

Incidentally, the rail grinder has greatly aided in the work of making satisfactory repair joints of this type, by facilitating the detail of finishing the head surfaces to a true level.

COMPROMISE RAILS

Compromise rails present another means of connecting dissimilar rail sections. They usually consist of two pieces of rail, one of each section to be joined and each having a length of from 4 to 5 ft., which are joined by some form of welding so that they present a length over all of from 8 to 10 ft. (Sometimes they may be only 6 ft. long over all, as when made entirely of cast steel conformed to each of the rail sections to be joined or compromised.) A compromise rail of this type is shown in the figure on page 1107. Compromise rails are quite often used at special trackwork where the outside pieces join the tangent track rails. In some cases, as in crossings, the outer arms of the frogs may consist of compromise rails, and this method of making connections between the T-rail arms of railroad crossings and adjacent girder rails in tangent tracks is quite often used as one of the best ways of making up such connections. The particular feature of compromise rails which commends them is that they permit the use of the regular joint plates or angle bars in making connections with the two dissimilar rail sections which are to be joined. They are quite often used in making connections between plain girder and groove girder rails in tangent tracks. Another use is for making temporary connections between new and old rail sections, which are dissimilar during the progress of reconstruction work.

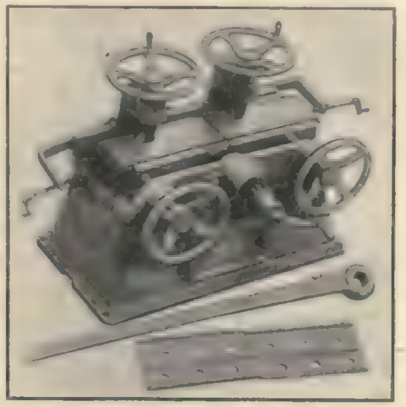


Fig. 21—Machine devised by C. H. Clark for upsetting joint plates

The three general types of compromises are as follows: (a) Welds, (b) cast-steel or composite, and (c) plates or bars. The weld type may be cast, thermit, electric-bar or electric arc. The cast steel or composite type may be made of cast steel or a combination of cast iron fillers and regular bars or plates. The plate type includes all such joints made up by the use of bar steel planed and upset or regular plates and angle bars upset and offset by forging. The accompanying figures on pages 1107 and 1108 show the general details of most of these types.

It should be remembered that the manufacturers of most of the patented joints for regular service in tangent tracks are prepared to furnish compromise joints which retain the general features of their regular joints. Some of these are also shown on page 1108, but it is not

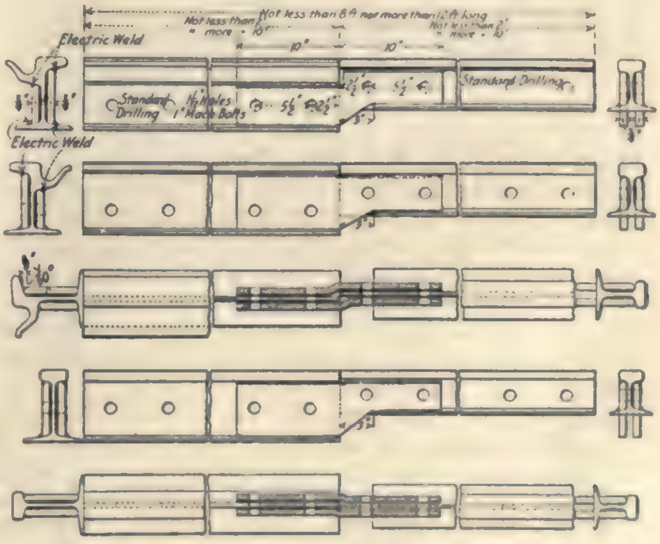


Fig. 22—Taper rails as developed by Pacific Electric Railway

to be assumed that the writer favors any particular joint shown or that these are all that are available. Mention is only made of the manufacturers' joints because it will quite often be found more economical to purchase them than to attempt to make them up in the railway shops, and the comparative costs as between the purchased and the railway product should always be obtained before the attempt is made to make them in the railway shops.

HOW THE "HAND" OF COMPROMISE JOINTS IS DETERMINED

There is more or less confusion in the designation of compromise joints with respect to their make-up. They are usually designated "right hand" or "left hand," as the case may be, depending upon their position in the track. If the position of the sections of rail to be joined is not clearly understood, something usually goes wrong. For this reason the American Electric Railway Engineering Association has recommended the method of designating compromise joints shown in the figure on page 1108. The manufacturers of special trackwork are prepared to follow this practice, although their own method, if thoroughly understood and followed, will produce the same results. This method, which is an old and long-established practice, is given in the illustration on page 1108.

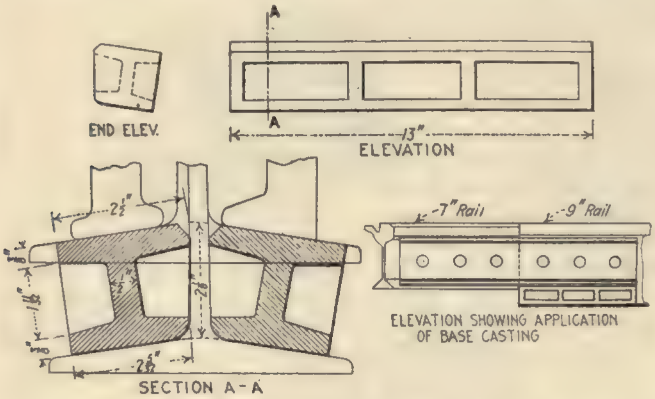


Fig. 23—R. P. Williams' compromise joint

Pennsylvania Railroad Awards Prizes for Good Maintenance Work

THE recent award of prizes for track maintenance by the Pennsylvania Railroad to section supervisors brings to attention the practice of this road in inspecting track and rewarding good work on the part of maintenance forces. To secure data upon which the track prizes are awarded a committee of officers goes over the line once a month in a special car attached to a regular train. To make the record accurate a specially designed machine is used to register every movement of the car, either horizontally or vertically. From the record thus made, together with close observation of the inspection committee and allowance made for relative speeds, an acccurate estimate can be made of the riding qualities of the different sections of track. The first prize amounted to $800 for the supervisor and $400 for the assistant. There were three other premiums of $800 each, of which $600 was for the supervisor and $200 for the assistants, and a special "improvement" premium of $1,000, of which $700 went to the supervisor and $300 to the assistant for having shown the greatest improvement in the line and surface of a supervisor's section of track for the year.

CABLE CAR TERMINUS AT MURRAYFIELD, SHOWING TRANSFER OF PASSENGERS FROM CABLE CAR TO BUS

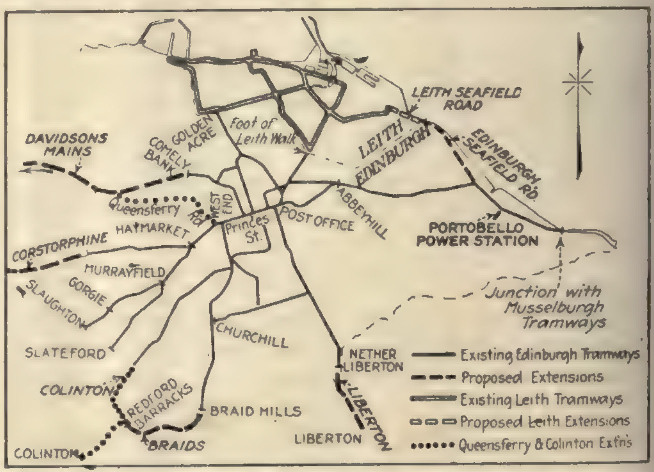
Change to Buses Progressing Rapidly in Edinburgh

Buses to Be Substituted for Cable Cars on Northern Routes and on Ardmillan Terrace-Slateford Line

SINCE the municipality of Edinburgh took over the Edinburgh & District Tramways in June, 1919, it has had to solve the problem of what to do with the existing cable system. The factors that determined the electrification of the through runs to adjacent cities and steady traffic lines and the use of motor buses for light traffic were discussed on page 680 of the Oct. 2, 1920, issue of the ELECTRIC RAILWAY JOURNAL.

About Nov. 1 the cable cars running on the northern routes were scrapped and buses similar in type to those running between Easter Road and Ardmillan Terrace were substituted. Between twenty-five and thirty buses will be required to give an adequate service on these northern routes, and it is the intention of the tramway committee of the Edinburgh Corporation to scrap all of the cable cars on these routes the moment sufficient buses are delivered from the manufacturers.

One factor which had to be considered in regard to the adoption of buses on these routes was the inferior carrying capacity of the bus compared with the tram-



MAP OF EDINBURGH CORPORATION TRAMWAYS AND PROPOSED EXTENSION UNDER ELECTRIFICATION PLANS

EDINBURGH CORPORATION NEW MOTOR BUS SERVICE FROM CABLE CAR TERMINUS AT CRAIGLOCKHART TO COLINTON

car. This difficulty, however, has gradually been overcome by designing the buses to carry a larger number of passengers. This, at the same time, helps solve the problem of financial difficulty in the way of their general adoption. The problem is still easier where the double-deck buses with their larger seating capacity are already in use. Because of the steep grades on certain routes of the city the tramway committee has not favored the operation of double-deck buses for Edinburgh streets.

As a solution for this difficulty, R. S. Pilcher, tramways manager, has been designing a bus body which he thinks will suit the needs of Edinburgh. It is a "single decker," but can seat thirty-nine passengers, or nine more than the buses at present running in Edinburgh. An extraordinary feature of the design is that the passengers enter the bus at the center instead of the end. Should this design accomplish the results hoped for, the city's transportation problem will be rapidly approaching solution.

THE SLATEFORD BUS LINE

The tramway committee has proposed that the electric cars should be taken off the Ardmillan Terrace-Slateford route and motor-bus service instituted. This proposal was contained in an interesting report drawn up by Mr. Pilcher and was given careful consideration by the committee. In the course of the report the tramway manager states:

CHAR-À-BANC ABOVE DUDDINGSTON LOCK ON ARTHUR'S SEAT TOURIST ROUTE

> The Slateford route was constructed in 1910 at a cost of £13,287. The length of the route is 1¾ miles. This route is isolated, and the passengers who use these cars are required to change either from the cable cars or the motor buses when traveling to or from the city.
>
> The break in the journey at Ardmillan Terrace is very inconvenient, and acts adversely on the traffic; the consequence is that this route, taken by itself, has never paid its way since it was constructed. At the present time the cost of operation on the cable system may be said to be 23.9d. per car-mile, and the cost of this electric line is certainly not less than 20d. per car-mile.
>
> The committee is aware that the motor-bus route from Easter Road Station runs to Ardmillan Terrace, where it forms a junction with both the electric line and the cable line from Gorgie.
>
> The natural route for this bus line would be to continue west via Angle Park Terrace and Slateford Road, and to connect up Slateford Village and Juniper Green to the city. If this were done, it would make an admirable route, and would be more economically run than by having the electric line with a break at Ardmillan and a break at the Slateford terminus. Such a route as indicated would form a quick and convenient means of transportation for the residents in the new housing estate and the new city suburbs of Clinton and Juniper Green.
>
> The facilities given by a direct bus route to Slateford Slaughter Houses and Markets would be better, from the public point of view, than the present system.
>
> The abandoning of this tramway is not a serious question, as the present high value of the overhead equipment and rails would warrant their being removed and utilized elsewhere. The Slateford route, if worked as a through route connected with the Easter Road route, could be made to pay its way; whereas, if it is continued as a separate route, it is not likely to pay for many years to come.

This report of Mr. Pilcher's was cordially approved by the committee, and it was agreed to run the buses to Slateford as soon as convenient. The electric cars, it is understood, may come in useful on the Leith system when once it has been taken over by the city.

The Edinburgh Corporation Tramway Department is now operating char-à-bancs for the benefit of sightseeing visitors, making a tour around Arthur's Seat. As this is located at an elevation of nearly 300 ft., from it an excellent view of Edinburgh, the neighboring towns, and the Forth can be obtained. These tours are made only from 10 a.m. until dusk, so that there is a possibility of using the buses to handle the morning rush if necessary.

2,200-Volt Line in Austria

ACCORDING to *Elektrotechnik und Maschinenbau*, the highest voltage direct-current line on the continent of Europe is a road recently put in operation between Peggau and Uebelbach, Austria. The pressure on the trolley wire is 2,200 volts, obtained from a 220-kw. motor-generator operated from the Peggau central station. The generator end of the motor-generator set has 12 poles and a commutator about 2 ft. 3 in. in diameter, with 483 segments in the commutator.

The electrical equipment for the single combination passenger and baggage car in use at the time of the publication of the article included four motors, permenently connected electrically in couples, so that each had a maximum operating voltage of 1,100. A dynamotor supplies 220 volts for the brake and other auxiliary equipment. The electrical equipment was supplied by the Austrian branch of Brown, Boveri & Company.

Herbert Hoover Heads Federated Societies

American Engineering Council Holds Meeting in Washington Nov. 18-20—Plans Are Laid for Nationwide Industrial Survey—The Engineers Adopt a Broad Policy of Public Service and Elect Herbert Hoover President to Guide the New Organization's Destiny

THE election of Herbert Hoover to its presidency, the adoption of a program involving a huge national survey in industrial conditions, and the selection of Washington for its headquarters were outstanding features of the first meeting of American Engineering Council held in Washington last week. Representatives of some twenty-two societies with an aggregate membership of approximately 50,000 constituted the official members of American Engineering Council and started the newly-formed Federated American Engineering Societies on an ambitious program. There were fifty-one authorized representatives, of which fifty were present. Since the representation on the council is proportionate to membership of the societies, some of the twenty-two societies represented sent from six to twelve delegates to the meeting.

It will be recalled that last June there was an organizing conference in Washington attended by some 141 delegates representing practically the entire body of engineers of the nation. At this organizing conference a tentative constitution and by-laws were drawn up, as reported in ELECTRIC RAILWAY JOURNAL for June 12, 1920, page 1213. Since that time the various engineering associations, both local and national, have been invited to become charter members of the Federated Societies and up to the time of meeting last week twenty-two have taken advantage of this invitation. There were present in Washington representatives of many other societies who are at the present time considering the invitation to join as charter members, some of whom have already taken favorable action but could not yet take final action due to constitutional limitations. The council at its session last week authorized the invitation to become a charter member of the association to be held open to any society until July 1, 1921.

"SERVICE" TO BE THE WATCHWORD

The formal sessions were opened by Richard L. Humphrey, chairman of the joint conference committee, which has been intrusted with the detailed steps of organization and with administering the affairs of the Federated American Engineering Societies between the organizing conference in June and the meeting last week. Mr. Humphrey spoke at some length in relating the history of the movement which has resulted in the organization and laid special stress upon the progress of the organization whose underlying policy is "service." Mr. Humphrey said in closing: "Indeed, the organization by the preamble adopted at the organizing conference, at which it was created, is dedicated to the service of the city, state and nation. In living up to this you should carefully guard each act and each step in the progress of the organization, to the end that the Federated American Engineering Societies shall stand for the highest possible ideals and shall enrich the glorious traditions of the engineering and allied technical professions."

E. S. Carman, American Society of Mechanical Engineers, was elected temporary chairman, and William E. Rolfe, Associated Engineering Societies of St. Louis, Mo., was elected temporary secretary.

The chief business accomplished the first day was the appointment of necessary committees to effect the permanent organization, and the decision to place the headquarters of the council in Washington. It was also decided to elect at this time only twenty members of the executive board rather than the twenty-four provided by the constitution, who with the six officers constitute the executive board of thirty. This provision was made to allow societies which become members between now and July 1, 1921, to have an opportunity to have representation on the executive board.

TRANSPORTATION AND HIGHWAYS DISCUSSED

J. Parke Channing, chairman of Engineering Council, which will turn over its affairs to American Engineering Council on Jan. 1, 1921, made an address outlining some of the work done by Engineering Council. Other addresses were given by E. Ludlow on conservation of fuel, L. W. Wallace on conservation of labor, and L. B. Stillwell on transportation. Mr. Stillwell devoted most of his remarks to the question of highway transportation and emphasized the fact that the variables of highway engineering are at present unknown. He further pointed out that out of every 100,000 motor vehicles, 7,000 of them are heavy trucks in excess of 4½ or 5 tons, and that these 7,000 are the chief agencies in destroying the highways. One of the problems which American Engineering Council can profitably take up is to try to determine the economic radius of truck transportation and its relation to railway and railroad transportation and as a result of this to guide the government in appropriations for, and regulation of, the highways. He pointed out that his home state, New Jersey, builds wonderful highways but allows private companies to wear them out with a few trucks to the great advantage of private capital.

On Friday, the council finally adopted the tentative constitution prepared in June, with a few very minor changes. Considerable discussion was held with reference to the provisions for publicity, but they were allowed to stand as written, the principle of open meetings and open discussions of all matters being sustained. Particular notice was taken of the helpful work done by the technical press as well as the publicity in the daily press with reference to the new organization.

The following six men were elected to be officers of the council: Herbert Hoover, American Institute of Mining & Metallurgical Engineers, president; Calvert Townley, American Institute of Electrical Engineers; William E. Rolfe, Associated Engineering Societies of St. Louis; Dexter S. Kimball, American Society of Mechanical Engineers, and J. Parke Channing, American Institute of Mining & Metallurgical Engineers, the four vice-presidents; L. W. Wallace, the Society of Industrial Engineers, treasurer.

In accepting the presidency, Mr. Hoover said that he recognized the position meant responsibility and work, but that he could not refuse a call from his engineering associates wherever that call meant useful service.

At the evening session, Mr. Hoover made an address in which he discussed the problems growing out of American industrial development and suggested that "engineers, with their training in quantitative thought, with their intimate experience in industrial life, can be of service in bringing about co-operation between these great economic groups of special interest," and stated that engineers will have performed an extraordinary service by so doing. He emphasized that this engineers' association stands somewhat apart among the various economic groups in that it has no special economic interest for its members. Engineers should be able to take an objective and detached point of view. Their calling in life, he said, is to offer expert service in constructive solution of problems to the individuals in any of the various groups. The wider vision is group service of engineers to group problems.

The Officers of American Engineering Council

No. 1. CALVERT TOWNLEY[*]
Vice-President
No. 2. HERBERT HOOVER[*]
President.
No. 3. WILLIAM E. ROLFE[*]
Vice-President

No. 4. DEXTER S. KIMBALL[†]
Vice-President
No. 5. J. PARKE CHANNING[*]
Vice-President
No. 6. L. W. WALLACE
Treasurer

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He pointed out that the majority of the membership of organized labor are individualists in their attitude of mind and in their social outlook, and that the expansion of socialist doctrines finds its most fertile area in the ignorance of many workers, and yet the labor organizations as they stand today are the greatest bulwark against socialism. He did point out, however, that some labor leaders overlook the fact that if we are to maintain high standards of living or productivity, it can only be in a society in which we maintain the utmost possible initiative on the part of the employer and that we can expand only by a steady increase of production.

Mr. Hoover then referred to the public statement of the officials of the American Federation of Labor that they desire the support of engineering skill in the development of methods for increasing production, and it is following this that Mr. Hoover suggests that the definite program of the new American Engineering Council include a complete investigation of industrial waste and the elements contributing to low production or low activity on the part of large employed groups.

The executive board at its meeting on Saturday passed resolutions in support of the project above mentioned as proposed by Mr. Hoover and also in support of the proposed federal department of public works, as advocated by Engineering Council and further, the compilation and preparation of tables of physical and chemical constants as undertaken by the National Research Council.

According to the constitution as finally adopted, the executive board will hold regular meetings, at least bi-monthly, to carry on the direction of the work of the council. The council, itself, will hold annual meetings with no restriction as to place of meeting. As a matter of fact, there is no restriction as to the place of meeting of the board, either, the action taken by the council merely locating the official headquarters at Washington.

An executive secretary, to whom will be intrusted the active organization of the various lines of work, will be chosen soon so that American Engineering Council will be able to take over the functions of Engineering Council on Jan. 1, 1921, as well as to undertake its own program. Meanwhile, L. P. Alford, American Society of Mechanical Engineers, one of the members of the executive board, is acting as secretary. Active work to interest other societies not yet members will be continued.

Letters to the Editors

Motor Bus Versus Trolley Car in Passenger and Freight Transportation

INTERNATIONAL MOTOR COMPANY

NEW YORK, Nov. 10, 1920.

To the Editors:

I have read the editorial in the Nov. 6 issue of the ELECTRIC RAILWAY JOURNAL to the effect that "Mr. Graham's Address Should Be Read by the Automotive Industry." It may interest you to know that at least one truck manufacturer has already taken measures to advise its various sales departments of its policy toward the electric trolley. Immediately after the convention at Atlantic City the International Motor Company sent a letter, copy inclosed, to its branches in which it was stated that the company was in accord with Mr. Graham's principles and believed that electric railway service is essential to meet transportation needs.

There is one feature of this matter, however, which should not be overlooked: With the granting of authority to increase fares the trolley companies are showing a tendency to abuse the privilege and overcharge the public. For instance, in Connecticut the Connecticut Company is charging 10 cents on routes radiating not more than 1 mile from city centers. The public considers this charge unreasonable and naturally turns to the motor bus for relief. It may be well at times for the trolley to have the motor bus as a competitor in order to save the trolley from itself.

With reference to your other editorial on the question "Shall We Turn the Freight Business Over to Motor Trucks?" I am sure there is an opportunity for considerable discussion on this point. At present we agree with Mr. Graham that the freight transportation is essentially the field of the motor truck just as urban passenger transportation is essentially the field of the electric trolley.

L. D. MILLER,
Sales Engineering Department.

[*Copy of International Motor Company Letter*]

INTERNATIONAL MOTOR COMPANY,
NEW YORK, Oct. 15, 1920.

TO ALL BRANCHES:

Yesterday, at the American Electric Railway Association Convention held at Atlantic City, George M. Graham of the Pierce-Arrow Motor Car Company gave a talk on "The Motor Vehicle—Ally or Competitor of the Trolley," in which he stated the following principles:

> That the problem of surface transportation of passengers in cities is best solved by the existing trolleys, and that the proper field for the motor bus is to augment the trolley service. The motor bus is an ally, not a competitor of the trolley.
>
> That the trolley companies do not possess the goodwill of the public because of insufficient service during rush hours and that a step toward gaining this goodwill would be to augment the trolley service by the operation of motor buses, even though such service might not be financially profitable.
>
> That the trolley companies have no legitimate field in handling freight. This is essentially the field of the motor truck, and the trolley companies should apply their energies and resources elsewhere.

This company is in entire accord with the foregoing principles and they will constitute the sales policy of the company relative to motor buses and freight handling by trolley.

The statements made by Mr. Graham were accepted enthusiastically by the trolley men present, especially his statement that the bus was essentially an ally of the trolley, not a competitor, and thus bus service could be used to advantage in offsetting public criticism of lack of service during rush hours.

You are, therefore, requested to get in touch immediately with the representatives of the local trolley companies in your territory who attended the convention and who heard Mr. Graham's speech, advising them of the intention of this company to co-operate with them in solving their transportation difficulties, mentioning the twenty-five-passenger steel body motor bus which we exhibited at the convention and which they, no doubt, saw and examined. Advise them that we are advocating a better type of motor bus which will last as long in service as the one-man safety car. Assure them that we are not in sympathy with uncontrolled jitney service, which is, at the present time, eating into their resources, but which, for evident reasons, cannot survive indefinitely. In other words, approach these people in a sympathetic attitude and see if we can help them.

That the motor bus is a live issue with the trolley companies was apparent to all who attended the convention and observed the way the remarks of Mr. Graham were received. Every effort should be made, therefore, to push motor buses while the incidents of the convention are still fresh in the minds of those who attended.

R. E. FULTON,
Vice-President.

Centralizing Responsibility for Employment and Labor Relations

NOTE.—The following communication was sent in with the suggestion that it be published in the JOURNAL to induce discussion on this important subject of employment and labor relations. The plan related has been worked out for and is about to be inaugurated in a medium-sized street railway and power company. The author requested that his identity be not disclosed for obvious reasons. Any discussion of the subject will likewise be run without signature if requested.—EDS.

To the Editors:

The establishment of an employment bureau on the ground floor, centrally located, taking over every phase of employment from all departments and centralizing all of this effort in one place, is the first essential in the effort to bring about correct employment relations in the public utility. All employees should enter service through this central bureau, and all separating from the service should leave through this employment bureau. Private interviews should be had with each applicant, by a person trained to the point of being a specialist in employment matters.

To function properly, the employment bureau should start out by preparing, through conferences with the department heads and foremen, the specifications covering every job in the entire organization and placing these in its files. This will be needed later when requisitions come from department heads for additional employees to fill certain jobs. The employment interviewer then fits the applicant and the specifications together.

Any interruption of service to the public is against public policy and tantamount to being illegal; therefore, every applicant for a job with a public utility should be told, in the employment bureau in private interview, that he is applying for a position to serve the public, and if sincere in his desire to serve the public he must agree in advance to an understanding that he is willing to sacrifice to some degree his freedom of action and subscribe to continuous service without interruption. He must agree to forego the privileges and right to strike, as the public demands continuous service. And if he is not willing to become a party to these agreements, then he must seek employment that does not require him to serve the public nor give up his right to strike. Acceptance by the applicant of employment with a public utility on these conditions places him where he may or may not become a member of a union. If he becomes a member of the union, he is pledged to arbitration in lieu of strikes. If he works as non-union, then the public utility should provide for him an employees' association as a means for collectively negotiating with the company that will prevent the union employees from having any advantage over the nonunion employee.

If the association of employees is properly conducted and covers every department, it should cost vastly less than the union and give the employees a great deal more in the way of sick and death benefits, ample medical advice both for prevention and cure to the employee and family, ample service from a trained nurse, and a centrally located food emporium that should sell, under the cash and carry plan, all of the necessities of the average family at cost to employees only.

An honestly conducted plan of employment relations along this line will soon swing the loyalty of the employees to the employer. There should also be two other separate and distinct organizations, namely, the safety department and the building and loan association. The latter should be not only self-sustaining but it should be mutual.

This plan for new employment relations should not be heralded by an orator from the stage to the mass of employees, nor should it be put over in anything like the manner of pressing a button to flood the room with light. On the contrary, its installation should consume from one to two years in accomplishment, and many weeks of preparation should be put in before any headway is apparent that would disclose a desire on the part of the employer to commune a little closer with his employees.

EXECUTIVE.

Theory and Practice at Harvard

HARVARD now offers opportunity for third year mechanical, electrical and civil engineering students to receive practical training along with their theoretical school work by means of a co-operative arrangement with more than fifteen large industrial establishments.

Students electing the co-operative program are divided into two sections, which alternate in two-month periods between the industries and school from September to September, with a vacation allowance of six weeks in the summer.

The students are placed in those industries for which they express a preference and for which they seem to have the necessary qualifications. In each industry they are placed in the various departments of the industrial organization in order to give them a broad perspective of the human, economic and engineering features of the business. Each student is supplied with a prepared list of questions upon entering each department and he is asked to answer these questions. In addition he is required to submit a semi-monthly technical report of some particular phase of the work which he has done.

Upon his return to school he reports twice a week to a class where he describes to his fellow students what he learned on his job. An instructor guides the discussion and questions in this classroom work. The student is supervised in his industrial work by the faculty, but is on an employee status in the industry and receives wages in accordance with his ability.

The industries have heartily indorsed the plan, as it fits in with their apprenticeship courses, permits them to size up promising material for their business and brings them and the colleges into closer relations with beneficial results.

Association News

Mid-Year Meeting in Chicago

Association Sets the Date for Feb. 10—Committees Are Actively at Work

THE mid-year meeting of the American Electric Railway Association will be held in Chicago on Thursday, Feb. 10, 1921. This announcement was made at association headquarters this week. The papers to be presented at the meeting will deal largely with problems relating to the financing and refinancing of electric railway companies. This topic was selected because, in the opinion of the subjects committee, it is one which is of great general importance and interest at the present time. The committee on subjects, of which J. D. Mortimer is chairman, expects to be able to announce soon the names of those who will present discussions on this subject. The meeting headquarters in Chicago will be at the Drake Hotel.

The program of the mid-year meeting will also include a banquet in the evening, at which it is expected there will be addresses of unusual interest. A meeting of the committee on arrangements for the dinner was held in Chicago on Nov. 18. The chairman of this committee is L. E. Gould. The other members of the committee are: B. I. Budd, F. R. Coates, Henry A. Blair, F. W. Brooks, H. E. Chubbuck, A. T. Perkins, H. L. Monroe, C. C. Peirce, H. J. Kenfield, John A. Benham, E. F. Wickwire, T. J. McGill, Edwin D. Meissner, D. W. Smith, R. P. Fisher, W. J. Pine, W. T. Butler, F. C. J. Dell, W. H. Sawyer and D. B. Dean. At the meeting on Nov. 18, sub-committees were appointed with chairmen as follows: Sub-committee on hotel arrangements, L. E. Gould; on speakers, H. A. Blair; on invitations, W. P. Butler; on ladies' entertainment, John A. Benham; on publicity, H. J. Kenfield; on seating arrangements, F. C. J. Dell; on transportation, R. P. Fisher, and on reception, F. R. Coates.

New York City's Subways Achieve World's Safety Record

NEW YORK CITY'S subways during the past sixteen years have achieved a world's record for safety. Three times the population of the globe have traveled on the lines of the Interborough Rapid Transit Company since the opening of the first route in 1904. In all that time accidents have resulted in seven deaths, or one to 614,400,000 passengers. The original subway was built to carry 400,000 passengers a day. By March, 1913, it was carrying 1,000,000 and now 2,000,000 persons often travel on it in a single day. Passenger service has increased during this period about 325 per cent.

The company's first line was only 17 miles long, with 62 miles of single track. Now the subway is 75 miles long and has 220 miles of single track. The employees during the first full year of operation numbered 2,600 and the wages amounted to $1,671,500. For the last fiscal year 9,000 men were employed and the cost of paying them had increased to $11,406,600. The coal bill during that period increased from $426,000 to more than $3,000,000.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

City Still Unyielding

Duluth Authorities, Following Defeat of Fare Plan, Seek to Force Service Increase

The City Council of Duluth, Minn., is again seeking a solution of the transportation muddle in that city growing out of the refusal of the Duluth voters to allow the Duluth Street Railway to increase its fare. The Council on Nov. 15 asked the city attorney for an opinion as to whether the company could be required to improve its service.

RELIEF TWICE REFUSED

The city attorney replied that the Council had the power to order the company to increase the service on various lines as well as to order the making of extensions. He further stated that, if the railway refused to comply with the Council's demands the city would have grounds for asking the courts for a writ of mandamus.

The present situation has been brought about by the refusal of the Duluth voters to allow the company to raise its fare from 5 cents to 6 cents. Several months ago the Council passed an ordinance providing for a 6-cent fare. At a referendum election held soon after, the proposition was rejected. The carmen, who had been promised an advance in wages contingent upon the raising of the fare, then went out on strike to force the city's hand.

To bring about a settlement of the strike the Council agreed to repass the fare ordinance. This, substantially in its original form, was resubmitted to the voters at a special election on Oct. 4. The proposition was again turned down, in spite of a warning by the railway that it could not continue to maintain its standard of service at a nickel fare.

SERVICE MUST BE REDUCED

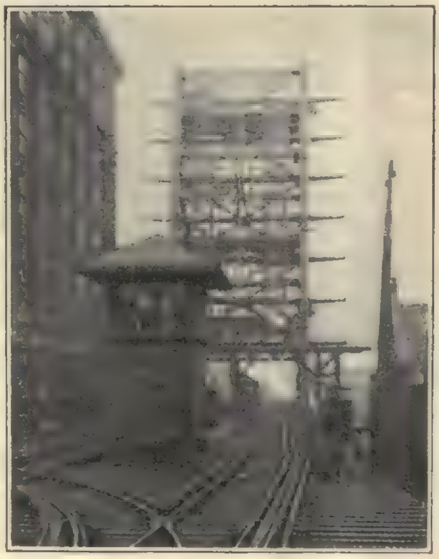
Immediately following the election Herbert Warren, general manager of the railway, announced that a substantial reduction in service would be made at once. Non-rush-hour service was reduced to a minimum and "owl" service was eliminated. At the same time a number of crews were laid off. The wages of the men retained on the payroll were increased 10 per cent.

In answer to the demands of the city authorities, officials of the company contend that they are unable under present conditions to put on additional cars. Mr. Warren, in discussing the railway's predicament, said recently:

> We are giving the best service possible on a 5-cent fare. I have said this before and it is as true now as when the statement was first made. We are willing to meet the City Council and will promote any plans for the betterment of the service that are possible considering the reduced income of the company. When the meeting takes place I will endeavor to have Mr. Robertson (president of the Duluth Street Railway) here with me so that we may be able to give a decision on whatever plans the Council lays before us.

Another Double-Deck Bascule Bridge in Chicago

Chicago already has two double-track bascule bridges in use. A third one is now under construction across the Chicago River at Wells Street to replace the present double-deck swing bridge, which carries the elevated trains above and the surface cars and heavy vehicular traffic below. The new bridge is being built over and around the old one without interruption to traffic. As it stands, reaching up into the air, the section of the new bridge shown in the accompanying illustration would appear to be long enough to span the river alone, but there is another half just like it on the opposite bank.



WELLS STREET BRIDGE WITH BASCULE RAISED. PHOTOGRAPHED FROM LEVEL OF ELEVATED LINE

A previous undertaking of similar nature was the replacement of the Lake Street bridge, which carried both surface and elevated cars, with a bascule bridge three years ago. In this case traffic had to be stopped for only a night while the old bridge was removed. The Wells Street bridge is an even more important link in the transportation systems of Chicago than the Lake Street bridge, as it carries all the through north and south elevated trains. It is expected that the delay to traffic incident to putting the Wells Street bridge into commission, however, will not be prolonged for more than one night.

Co-operation Essential

Judge Mayer, Discussing New York Transit Situation, Calls on Civic Bodies to Aid

Settlement of a city's transportation problems calls for the co-operative effort of local civic and business organizations. This is the opinion expressed by Judge Julius M. Mayer of the United States District Court in an address to the Flatbush Chamber of Commerce, Brooklyn, N. Y., on Nov. 18. In the course of his remarks Judge Mayer declared that "once the people are aroused to the pressing importance of the situation, they will be impatient at insincere obstruction and will insist on a prompt and fair solution of problems already too long unsolved."

As judge of the Federal Court he is in charge of affairs of a number of roads now in receivership, including the Brooklyn Rapid Transit Company and the New York Railways. Referring to the local situation he declared that, "nothing can be gained from the kind of controversy which has for its ultimate purpose the accomplishment of some political end."

CONSTRUCTIVE ACTION NECESSARY

The transit problem, said Judge Mayer, should be approached "with good temper and with the single purpose of arriving at a solution which will be fair to the public and fair to the investors."

Judge Mayer said further:

> For nearly two years the B.R.T. and the New York Railways have been in the hands of receivers. Both the court and the receivers would be happy if they could be relieved forthwith of their responsibility.
>
> During these two years the receivers and the companies have been compelled to litigate certain questions of law, but not one single constructive act, in the way of the solution of the transit problem, has been contributed by the officials having any power in the premises. On the contrary, everything seems to have been done to embarrass and delay a solution of the problem.
>
> It is not a fact that there is a universal 5-cent fare. The financial condition of the surface lines has compelled disintegration, both in your borough and in other boroughs, with the result that the public is paying in some instances 10 cents and 15 cents where heretofore they paid 5 cents for a similar ride. In some sections of your borough and other boroughs surface line service has been temporarily discontinued and such steps have been necessary in order to make it possible to run other parts of the system.
>
> The subway systems have been greatly handicapped in regard to increased equipment and questions of maintenance and have not made the progress which could have been made, if the subject had been fairly and intelligently treated.
>
> The problems are so vital to the welfare of the city and its people and so difficult and varied that, on an occasion of this kind, I cannot do more than refer to them. The health, welfare and happiness of the people at large and the growth and prosperity of the city, as a municipality, demand that there should be immediate effort to deal with the problem in a broad high-minded and statesman-like way.

Collective Bargaining on B. R. T.

Court and Receiver Work Out Plan Whereby Employees Will Deal Directly with the Management

An employees' representation plan intended to create an organization to take the place of the Brooklyn locals of the Amalgamated Association of Street and Electric Railway Employees of America, was announced on Nov. 18 by Lindley M. Garrison, receiver of the Brooklyn (N. Y.) Rapid Transit Company. The scheme provides for the election by the employees of representatives who will deal directly with the management. The election is to be by secret ballot, and the votes will be canvassed by Alfred M. Barrett, Public Service Commissioner of the First District, and Transit Construction Commissioner John M. Delaney. Through the new organization the employees will be able to bargain collectively with the receiver.

JUDGE Julius M. Mayer of the United States District Court co-operated with Mr. Garrison in the preparation of the new plan. Judge Mayer, in whose hands the affairs of the B. R. T. system now are, has steadfastly declined to recognize or have any dealings with the Amelgamated Association. He stated his willingness, however, to treat with a committee representing the employees as employees. On Sept. 2 he declared that "the court will see to it that the right of collective bargaining will be carefully safeguarded and that representatives of their own choice shall have direct dealings with the management."

STRIKERS ARE BACK

Unable to secure recognition for the Amalgamated, the strikers returned to work as individuals. The strike was officially declared "off" when three hundred former employees, the last to give in, applied for their former jobs and were taken back. Employees who are members of the Amalgamated Association will not be permitted to vote in the election of representatives, or to act as representatives. To be eligible for membership in the new organization, each employee must sign the following pledge:

> I am not a member of the Amalgamated Association of Street and Electric Railway Employees of America, and I will not become a member while in the employment of any of the above (companies), and I agree that while I am so employed I will not make any effort among the other employees to induce any such employees to become members of said Amalgamated Association of Street and Electric Railway Employees of America.

ENTIRE SYSTEM INCLUDED

The new plan will apply to all employees of the entire Brooklyn Rapid Transit System and the Brooklyn City Railroad who at the present time are not represented by committees under working agreements. A primary election will be held on Nov. 29, and an election of representatives on Dec. 13. That there may be no suspicion that the management is attempting to control or to influence the choice by the employees of their own representatives, the management has requested Messrs. Barrett and Delaney of the Public Service Commission to supervise the primary at which the nominations will be made. These officials have consented to act.

Under the new plan the employees will be divided into voting units, each of which will be entitled to one or more representatives. Any matter which in the opinion of any employee requires adjustment, and which the employee has been unable to settle with the foreman or official in charge of the work on which he is engaged may be referred to the representative or representatives of the voting unit in which the employee works. The method of procedure to be followed in such a case is outlined as follows:

> Such representative, or representatives, if they consider the matter worthy of attention, will then take it up for discussion and adjustment with the foreman or official in charge of the work. If such representatives and such foreman or official in charge of the work, cannot adjust the matter, then such representatives may take the matter up with the head of their particular department. If the matter is not then adjusted, where there is more than one voting unit in a group, and the representatives feel that it is of general interest to employees of that group, the matter may be referred to the representatives of that group, who may then take it up with the head of the department. . . .
>
> If the representatives of a group or department, or the executive committee of such representatives, as above provided, fail to adjust the matter with the head of the department, they may then take the same up with the management.

MANAGEMENT ASSUMES EXPENSE

Each representatiye will be free to discharge his duty in an independent manner without fear that his individual relations with the company may be affected by any action taken by him in his representative capacity. It is further provided that each representative shall have the right to appeal in person or through the other representatives of his group, to the head of the department for redress in respect to anything alleged to be a personal discrimination on account of acts performed in a representative capacity. If a satisfactory decision is not then forthcoming from the head of the department, the representative may appeal directly to the management. Failing of an agreement in this case, the plan provides that an appeal may be taken to the Public Service Commission.

The management will assume all necessary expense of the nominating primaries and elections, and will also provide places at which the primaries, elections and meetings may be held. The management will further pay the employees at their regular rates for all time directly and necessarily lost by them on account of time devoted to their duties as representatives.

Representatives shall be elected for a term of one year and shall serve until their successors are elected. They shall be eligible for re-election. A representative shall be deemed to have vacated office upon ceasing to be an employee of the company, or upon permanent appointment to the position of inspector, foreman, assistant foreman, or other position in the supervisory forces of the company. The qualifications for voters are as follows:

> At the first nominating primary and election, every employee who has been in the employ of the company for the sixty consecutive days prior to the date of the primary and who is not a member of the Amalgamated Association of Street and Electric Railway Employees of America, shall be eligible to vote at the nominating primary and at the election, in his or her particular voting unit, provided, however, that no inspector, foreman, assistant foreman, or other member of the supervisory forces of the company shall be able to vote at the primary or election.

Nominations and elections shall be by secret ballot and shall be so conducted as to avoid any undue influence upon, or interference with voters in any manner whatsoever, and to prevent any fraud or mistakes in the casting or counting of ballots. At each primary there shall be elected inspectors of election who shall conduct the ensuing election and the next primary election thereafter. There shall be elected one inspector for each voting unit, who shall serve with a representative of the company and the election officials.

DETAILS OF ELECTION PROCEDURE

No more than three times the number of names to be voted for as representatives at any election will be placed on the ballot for that election. Those receiving the highest votes at the primaries up to that number, will be placed on the ballot. For example, if a unit is to elect two representatives, the six names receiving the highest number of votes at the primaries will be placed on the ballot for the election. The names of the nominees for election shall be conspicuously posted for a reasonable time before the day of election.

Toledo Wants Commissioner

Applications to Be Held Open Until Dec. 4—Engineer Not Essential—Mixed Bus and Car Service

The board of control of Toledo's street railway system under the new service-at-cost commission was called together for a meeting on Nov. 18 for the purpose of organizing and to take a preliminary look at the problems confronting it in getting the new franchise plan into working order. Henry C. Truesdall, banker and attorney, was elected to be chairman, and W. W. Knight, business man, to be secretary by unanimous consent.

Mayor Cornell Schreiber sat with the members of the board on account of the fact that the appointments are not legally effective until the ordinance has been formally accepted by the Toledo Railways & Light Company, and assignment of its rights made to The Community Traction Company, created by the ordinance. The Mayor also wanted to sit with the board of control so that a mutual choice might be made for transportation commissioner.

At the meeting it was decided to hold applications open for the position of commissioner until Dec. 4. The applications are to be addressed to Henry C. Truesdall, Northern National Bank, or Mayor Cornell Schreiber, Toledo. They will be considered strictly confidential in order to protect any men who may apply.

ENGINEERS NOT NECESSARY

The board members made it clear at their meeting that an engineer will not necessarily be appointed to the position. It was felt that a business executive with a good record of service and able to appoint qualified assistants to gather engineering and financial technical data might be appointed to the position.

The appointment is to be made by the board of control but must be confirmed by the Mayor. All applications will be considered jointly so that there will be no delay in the selection of the transportation commissioner.

Toledo engineering bodies and some luncheon clubs have expressed themselves as favoring the appointment of a Toledo man for the position. One group has publicly backed Harry C. McClure, city engineer under Board Member David H. Goodwillie, for the place. Cecil Rood, county surveyor, and several others have been named as applicants.

The board of control at its meeting also looked into several provisions of the ordinance in respect of their duties. They were practically unanimous that crosstown service should be provided as soon as possible.

After selecting the commissioner the board must prepare a plan as provided in section ten of the ordinance:

> For the rearrangement of the street railway system in the city of Toledo, with a view of giving the best service to the city with the highest operating efficiency and economy. Such proposed plan shall also contain provisions for a crosstown line or lines.

Members of the board expressed themselves as favorable even to a mixed service of buses and street cars to make some sort of crosstown service available as soon as possible. They will probably begin on this question as soon as the transportation commissioner has been selected.

NEW ARRANGEMENT OF LINES

The new arrangement of the railway lines approved by the board of control will have to be submitted to the Council for final approval before it is put into effect.

City Clerk Albert Payne and the Mayor have construed the ordinance provision requiring acceptance to be filed within ninety days after passage to mean that this time limit shall begin to operate from the date when the ratification by the people was certified to the city clerk. In this case the final date for putting the cost-of service plan into effect may be about Feb. 15, 1921. At the will of the company it can be put into effect at any time before that date.

Referendum to Be Taken

National Chamber of Commerce Plans Nation-Wide Vote on Transit Facilities and Submits Report of Its Public Utility Committee

Declaring that equitable readjustment and not past performance is the immediate problem confronting the electric railways, the public utilities committee of the United States Chamber of Commerce in a report made public on Nov. 24 urges the retention of the principle of private ownership with public regulation. The report, devoted to a discussion of the present status of the traction industry, recommends a more constructive attitude on the part of the people at large and asks that electric railways be relieved of burdensome costs not directly connected with the rendering of service. The recommendations of the committee will be submitted to the members of the United States Chamber of Commerce in the form of a referendum.

EIGHT propositions will be submitted to the members for approval. These are:

1. Existing traction facilities should be conserved.
2. The attitude now taken toward street railway problems should be based upon the present and future needs of the community.
3. The attitude which is taken toward street railway problems should contemplate private ownership and operation.
4. Regulation should everywhere be instituted that will promptly follow changes in the situation of the companies rendering service of local transportation.
5. Provision should be made against the consequences of unfair competition.
6. All burdens unrelated to the service performed should be removed from street railways.
7. Official responsibility should be definitely fixed for the application of regulation.
8. Each company should seek to have available for the public at all times the facts as to the results of operation and should have resident responsible executives wholly conversant with local requirements.

EXHAUSTIVE STUDY MADE

The committee's report follows an exhaustive study of the electric railway situation. Those signing the report are: Lewis E. Pierson, chairman, board of directors Irving National Bank, New York City; Henry G. Gradlee, president, Stone & Webster, Boston, Mass.; Arthur W. Brady, president, Union Traction Company, Anderson, Ind.; F. B. DeBerard, director of research, Merchants' Association, New York City; E. K. Hall, vice-president, American Telephone & Telegraph Company, New York City; Albert W. Harris, president, Harris Trust & Savings Bank, Chicago, Ill.; Charles L. Harrison, president, Sinking Fund Trustees, City of Cincinnati, Cincinnati, Ohio; J. W. Lieb, vice-president, New York Edison Company; H. L. McCune, of the firm of McCune, Caldwell & Downing, Kansas City, Mo.; P. N. Myers, president, St. Paul Association of Public and Business Affairs, St. Paul, Minn.; John W. Van Allen, of the firm of Wilcox & Van Allen, Buffalo, N. Y.

This will be the thirty-third referendum of the chamber's membership. With each ballot put out there goes the report of the committee making the recommendations, and in addition extensive references to arguments in the negative.

The committee finds that one great cause for public indifference to the situation of local street railways lies in widespread belief that in the earlier history of many traction companies there was financial mismanagement. Even in cases where this has been the fact, however, it becomes relatively unimportant at this time, says the report, inasmuch as the problem should be approached from the point of view of the value of the property used for the public service rather than from the point of view of the outstanding securities. On this point the report says:

> If it be conceded that the public interest is to obtain good service at lowest cost and that street railways are essential and necessary, then the sensible way to deal with the problem is to permit existing organizations and present properties to earn a sufficient sum over their operating expense to induce investment. of capital for extensions and improvements to existing facilities. It is not a question of past financing but of present earnings and there should be provided a margin sufficient and cheapest service to patrons of utilities and to the public in the communities served. Believing that this position is in the highest public interest the committee recommends that the attitude which is now taken toward street railway problems should be based upon the present and future needs of the company, and not upon earlier conditions. Equitable readjustment and not past performance is the immediate problem.

With regard to ownership the report states that a canvass of every consideration that has been brought forward in support of public ownership has resulted in the committee's finding it "no solution of present problems or means for meeting future requirements." The committee therefore recommends "that the attitude which is taken toward street railway problems should contemplate private ownership and operation of local transportation facilities."

REGULATION SHOULD BE REASONABLE

The committee recognizes regulation as a necessary corollary to private ownership and operation. Regulation should have for its purpose the conservation of the public interest which "centers in adequacy of service at reasonable cost." It is further stated that:

> As adequacy of service is possible only from an enterprise that can command capital with which to provide the facilities the public interest requires, regulation must in this regard contemplate the situation of the companies that are regulated. Both for the present and the future, elasticity should be substituted for rigidity. Through public authority provision can be made on the one hand to adjust charges for service to yield revenues that are adequate for proper conduct of the utility. Moreover adjustments through regulation must promptly follow the conditions that call for them; for every delay in the application of a remedy that bears upon a matter of public interest is detrimental to the public itself.

Regulation in whatever form involves duties on the part of the public as well as on the part of the companies, continues the report. One of these duties is to protect a company serving the public from unfair competition from any source. This does not mean that local transportation as it now exists should be perpetuated regardless of advances that may be achieved in the art of transportation or in the science of regulation. It does mean, however, that a company which is rendering service and should be developed in efficiency should not be subjected to competition from any other source which is not under corresponding regulation and obligations. Continuing, the report says:

> The whole purpose of regulation implies that the companies subject to regulation should be responsible only for performing the service they have undertaken. Their efficiency and the reasonableness of their rates of charge are the matters which should have undivided attention. Reasonableness in rates should be decided only with reference to the service that is rendered. In other words the rates charged for street railway transportation should not be made an indirect method of taxation for the community. A street railway company should be taxed only on the basis of other comparable taxpayers. Your committee recommends that all burdens placed upon street railway companies and unrelated to the performance of the service they render the public should be discarded.

A Single Agency Necessary

Both the public and a company which serves it, says the report, should be able to look to a single agency of the public, whether a local official, or a board, or a public utilities commission, as directly and solely responsible for the application of regulation. Responsibility for exercise of the public function involved in finding facts and applying to them the principles which have been laid down by the public, should be clearly located. In matters of public importance there should be no division of authority; for division of authority is almost invariably followed by escape for everyone from responsibility for performance of the public function. The committee recommends that official responsibility should be definitely and unmistakably fixed for the application of the regulation.

Adequate provision for having the public informed regarding the company and its operations and for having the company acquainted with the needs of the community, the committee points out, will serve to prevent controversies that may have little relation to facts and to concentrate attention upon the one question which is of paramount importance to the company and to the public—adequate and efficient service at the lowest rates consistent with the maintenance of such service. To this end the committee recommends that a company providing local transportation should seek to have available for the public at all times the facts as to the results of its operation.

Twenty-five Miles for Five Cents

The Utica Avenue (Brooklyn) extension of the Interborough Rapid Transit Company's rapid transit lines was opened on Nov. 21. The extension is less than 2 miles long. It extends from Utica Avenue and Eastern Parkway to Livonia Avenue and Junius Street, East New York. With the opening of this extension it is now possible to ride for a single 5-cent fare from 241st Street and White Plains Avenue in the Bronx to the Brownsville section in Brooklyn, a distance of about 25 miles.

Kansas City Undisturbed

Receivers Function in Harmony With Previous Management—Plea for Co-operation of Public

The receivers of the Kansas City (Mo.) Railways are continuing the operation of the system with the organization as they found it. Because of their relation to the public, the city, the company and the employees, the receivers are apparently able to bring about results which the company alone found it difficult to achieve. The most striking instance of this kind is the success so far attending the installation of the rerouting program.

Beeler Program to Be Carried Out

This plan had been worked out by the company long before the advent of the receivers, but it waited for introduction on action of the City Council. The receivers now plan to introduce in full the Beeler program, completed several months ago, few of the isolated suggestions of which have up to the present been put into effect by the company. The comprehensive system of routing is comprised in an ordinance which the receivers have discussed thoroughly with the city officials and Aldermen.

The receivers have said that they expect the Beeler program to effect a substantial improvement in service. They installed a new schedule on one of the lines on Nov. 10, increasing the headway in rush hours, and showing a gain in revenue from $3.44 to $3.68 per car-hour. They are studying the data which the departments of the company have been collecting, and are inclined to put into effect promptly orders based on conclusions from such study and recommendations of officials.

Colonel Fred. W. Fleming is giving close personal attention to all reports filed by departments, as indeed is Francis M. Wilson, the other receiver. They have offices in the executive suite of the railway building. There seems to be slight if any disturbance of routine because of their control of the property, all officials and heads of departments functioning practically as before. Colonel Kealy, president of the company, acting as adviser of the receivers, and other heads are performing their duties very much as usual. There has quickly developed a sense of confidence in the continuity of the organization, which has done a great deal to preserve the morale and stimulate the energy of the personnel.

Goodwill Promoted

The receivers have held meetings with department heads to learn the previous program as to building of morale and to make suggestions along this line. Other meetings of groups are planned. The receivers have said that they wish to promote especially such conduct of employees toward the public as will best cultivate goodwill.

In the direction of cultivating goodwill and a complete understanding of the company's situation with reference to giving service, Mr. Wilson addressed one of the community improvement associations recently. He presented a statement of the financial affairs of the railway, and gave details as to equipment used. He also declared that the improvement of service was "up to the public."

City Over-serviced

The receivers are impressing upon the public of Kansas City the fact that Kansas City is already receiving an unusually high grade of service. One of the receivers said recently that the city was over-serviced with cars. He declared Kansas City had almost exactly the same trackage as Cleveland, with only half as many people.

A specific instance of the scrupulous maintenance of the organization already operating the railway is the use being made by the receivers of the machinery of the board of control. This board, consisting of P. J. Kealy, president, representing the company, and Colonel E. M. Stayton, representing the city, formerly had authority to institute certain matters; under the receivers the board continues to work practically as before, except that when authority is required the receivers supply it through their own orders.

Contracts Soon to Come Up

Action regarding certain contracts, particularly that for the construction of the Twenty-third Street viaduct, may be taken soon. The Federal Court had postponed decision until the receivers could familiarize themselves with the matters. On Nov. 19 the court issued an order relative to the viaduct. This was to the effect that the receivers should have an opportunity to secure modification of the existing contract, under which modification different terms of payment might be prescribed and the railway might have actual property interest in the viaduct when completed. Negotiations are under way with the contractor, the city, and other parties at interest. If these are successful the receivers may adopt the contract.

Urges Hydro-Electric Development

The California Railroad Commission in its last report declares that what California needs most at this time is the development of its unused water powers. The commission states that the utility consumer, utility owner and utility labor through just distribution and proper co-operation can best bring about this state development.

The commission further states that of all utilities, electric railways have borne the greatest burden within the last few years due to rapidly advancing costs. Still, it contends that they are a utility that could not be dispensed with even though jitney and automobiles have perhaps become a more important factor in transportation in the State of California than in any other state in the Union.

Des Moines Case Put Off

Company Going Behind, but Fears Effect of Further Advance in the Rate of Fare

The hearing of evidence looking toward a solution of the electric railway controversy at Des Moines, Ia., was started during the week ended Nov. 20 before the three masters appointed by Federal Judge Martin J. Wade. The masters in the case are John A. Guiher, member of the Iowa Railway Commission, E. D. Perry, attorney, and Paul Beer, engineer.

COMPANY GOING BEHIND FOR MONTHS

Attorney Gamble for the Des Moines City Railway introduced evidence to show that the company had been running behind for months and that the total deficit for the fiscal year ended Sept. 30 was $22,407. According to the figures introduced by Mr. Gamble the gross returns for the year were $1,989,328. Operating expenses were $1,612,212, leaving net earnings of $362,116. Fixed charges, including interest on notes, were shown to be $384,623. Counsel indicated that with the deficit of $22,407 no account was taken of depreciation. Neither did the figures just cited take into account a sum of $56,844 due the employees for back pay. This amount was originally $72,878, but a number of payments have been made reducing it to the above figure. A payment of $12,389 was made on the back pay in October.

The company further showed that on the basis of the experience of the past two years, even considering a continuation of the present 6-cent fare, the deficit for 1921 would be $19,000.

Two possibilities were presented by the company as a remedy for the present financial difficulties—a further increase in fare or a considerable cut in the service now being furnished.

Attorney Gamble outlined the plans of the company as a way out of the difficulty to include an 8-cent fare for adults, 5-cent fare for children and continuation of the present 10-cent fare on lines extending beyond the city limits. The company is apprehensive, however, that in the event the higher fare were granted traffic might fall off to such an extent that there would still be financial questions to meet. Even the 6-cent fare has reduced traffic over what it was under the former rate. In the event the higher fare is granted, however, the company outlined material increases in service, but stated that if the 6-cent fare was continued it would mean a service cut to the minimum.

HEARING CONTINUED TO NOV. 24

Before the company completed its evidence the hearing was continued until Nov. 24 by reason of the fact that W. E. King, of the engineering firm of Toltz, King & Day, which recently made the appraisal of the railway property for the city could not be present at the hearing until that time.

Officers of the union of railway employees announced that they would make no attempt to force payment of the back wages until such time as they could be met by the company, as they realized the present financial troubles which the company was facing.

Akron Ordinance Advanced

The proposed new contract between the Northern Ohio Traction & Light Company, Akron, Ohio, and the city of Akron for the operation of the company's local lines, referred to at length in the ELECTRIC RAILWAY JOURNAL for Nov. 20, page 1072, came up for second reading before the Council last Tuesday. It is necessary that the ordinance shall be presented for third reading before the Council passes finally upon the matter.

According to the provision of the city charter the ordinance will then have to pend for thirty days, during which time a referendum may be called. In order that there may be a referendum 10 per cent of the registered voters must file such petition within thirty days of the passage of the measure. The city clerk has ten days following the presentation of any referendum petition to check the referendum. If the matter does go to a vote, it may be ninety days before the ordinance is finally submitted to the people for their approval.

The ordinance has been reprinted in pamphlet of thirty-two pages. It is being distributed very thoroughly among the residents of the city. The head of practically every family will receive a copy of the ordinance by mail at his home for his careful consideration.

Interurban Men Accept Award

The motormen and conductors employed on the interurban lines of the East St Louis & Suburban Railway, East St. Louis, Ill., have voted to accept the wage increase of 13.41 per cent awarded recently by a board of arbitration.

The carmen are not satisfied with the increase granted, according to W. L. Perry, president of the local union, but he said they would accept because of an agreement entered into previously to the effect that they would accept the ruling of the board of arbitration.

The board was composed of David M. Walsh, representing the men; C. E. Smith of St. Louis, representing the company, and Henry F. Bader, former Mayor of East St. Louis, representing the public. Messrs. Bader and Smith signed the award, the union representative dissenting. The increase brings the salary of crews on two-man cars to 60 cents. Men on one-man cars will receive 66 cents an hour. The award is retroactive to May 1, 1920, and is effective until May 1, 1921. D. E. Parsons, general manager of the system, said about seventy-five men would be affected by the award and that each would receive about $100 back pay.

The city men in East St. Louis are now receiving from 70 to 73 cents an hour. That scale was decided upon by another board of arbitration.

News Notes

City Asked to Arbitrate.—Representatives of several labor unions in Trenton, N. J., have appealed to the Trenton City Commission to intervene in the dispute between the New Jersey & Pennsylvania Traction Company and its employees. The carmen are now on strike, demanding higher wages. The commission is asked to act as a board of arbitration in the case.

Saginaw Men Still Out.—The situation at Saginaw, Mich., with respect to the strike of the trainmen of the Saginaw-Bay City Railway, was unchanged on Nov. 15. The men were still out then and no cars had been run in Saginaw since Oct. 31. The men still refuse to work for the former rate of wages. They want an advance of 10 cents an hour. This the company finds itself unable to grant with the fare now in effect. On the other hand, the company has been unable to recruit men to take the places of the strikers at the rate of wages in effect prior to Sept. 30. So far as the situation over fares between the company and the city is concerned that remains deadlocked. The conditions leading up to the strike were reviewed at length in the ELECTRIC RAILWAY JOURNAL for Nov. 13.

Crosstown Transit Line Advocated.—A transportation improvement plan for the Borough of Brooklyn has been outlined recently by M. T. Donnelly, Deputy Public Service Commissioner. In his opinion the Queensboro Plaza-Crosstown Route, plans for which were adopted and approved in 1914, is now of vital necessity to the development of Brooklyn. In a review of the transit needs of Brooklyn and Queens, he says: "The aim is to run a line as nearly straight as practicable from Queensboro Bridge Plaza to the Brighton Beach division of the Brooklyn Rapid Transit System. A crosstown rapid transit route is the only improvement needed to round out the development of Brooklyn. Such a crosstown route would connect with 7 miles of the four-track Brighton Beach line and the Astoria and Corona elevated lines—a rapid transit route from the Atlantic to Long Island Sound."

Program of Meeting

New York Railroad Club

The New York Railroad Club will hold its second annual dinner at the Hotel Commodore, New York, on Dec. 16. The program includes a prominent speaker, a friendly crowd, music and chorus singing under the direction of Miss "Bobby" Besler. Charles R. Ellicott is chairman of the dinner committee.

Financial and Corporate

Brazilian Companies Do Well

Rio de Janeiro and Sao Paulo Tramway, Light & Power Companies Show Highly Satisfactory Results

The seventh annual report of the Brazilian Traction, Light & Power Company, Ltd., Toronto, Ont., for the year ended Dec. 31, 1919, shows that the company's financial position has been strengthened. The gross earnings from operations in Brazil for 1919 were about $30,320,000. This was an increase of $4,450 000, or 17 per cent over 1918. Net earnings from operations in Brazil amounted to $15,655,477 in 1919, compared with $13,236,477, or 18.4 per cent. The miscellaneous revenue and non-operating income, together with the operating income, increased the gross income to $16,118,408 in 1919. In 1918 the gross income was $13,440,627, so the increase of 1919 over 1918 was $2,677,781, or 20 per cent. After all charges for bond interest, depreciation, sinking funds, etc., had been deducted, the gross revenue of the company for 1919 was $8,877,000, an increase over 1918 of $2,625,540, or 42 per cent. Expenses of the company, taken as a whole, increased 20.5 per cent from $832,800 in 1918 to more than $1,000,000 in 1919. The net revenue left for dividends and other deductions was $7,873,967, an increase over 1918 of $2,454,295, or 45 per cent.

245 MILES OF RAILWAY

More than 245 miles of track in Brazil are operated by the Rio de Janeiro Tramway, Light & Power Company. This line in itself had gross earnings of $9,375,000 in 1919, an increase of 28.6 per cent over 1918. The net earnings increased from $4,120,000 in 1918 to $5,270,000 in 1919, or about $1,150,000. The car-miles for 1919 were 27,677,655. In comparison with 1918, this was an increase of more than 11 per cent. The total number of passengers carried was 256,165,076, an increase of 36,127,706, or 16.4 per cent over 1918. The operating ratio remained practically unchanged. Twenty-four passenger cars and twenty-three passenger trailers were added to the company's equipment during 1919.

Another subsidiary of the Brazilan Traction, Light & Power Company is the Sao Paulo Tramway, Light & Power Company. The gross earnings were $6,940,000, an increase over 1918 of 21.6 per cent. For 1919 the net earnings were $4,445,000, an increase of $645,000, or 17 per cent. More than 143 miles of single track are operated. The total car-miles were 10,821,370, an increase over 1918 of 6 per cent. Over 12,658,000 more passengers were carried in 1919 than in 1918, an increase of 20 per cent. The operating ratio changed only 2.6 per cent.

The revenue of the companies is received in Brazilian currency—milreis—and the exchange rates prevailing between Brazil and London or New York determined the revenue expressed in dollars in the tables.

INCOME STATEMENT—BRAZILIAN TRACTION, LIGHT & POWER COMPANY

Year ended Dec. 31	1919	1918	Percentage Change
Gross earnings from operation in Brazil	$30,320,000	$25,870,000	+17.1
Total expenses of operation in Brazil	14,664,523	12,533,777	+16.8
Net earnings from operation	$15,655,477	$13,236,223	+18.4
Miscellaneous revenue	86,160	74,354	+15.9
Operating income	$15,741,637	$13,310,577	+18.3
Non-operating income	376,771	130,050	+190.0
Gross income	$16,118,408	$13,440,627	+20.0
Deductions from gross income:			
Bond interest, etc	$4,143,517	$4,377,310	—5.4
Reserve for depreciation and sinking fund	3,097,886	2,810,854	+10.2
Total deductions of subsidiaries	$7,241,403	$7,188,164	+0.7
Gross revenue of Brazilian Traction, Light & Power Company	$8,877,005	$6,252,463	+41.9
Total charges Brazilian Company	1,003,038	832,791	+20.5
Net revenue	$7,873,967	$5,419,672	+45.2

STATISTICAL INFORMATION RIO DE JANEIRO TRAMWAY, LIGHT & POWER COMPANY

Year ended Dec. 31	1919	1918	Percentage Change
Gross earnings from tramways	$9,375,000	$7,285,000	+28.6
Net earnings from tramways	$5,270,000	$4,120,000	+27.8
Miles of single track	245.62	243.34	+0.9
Car-miles	27,677,655	24,829,807	+11.4
Number passengers carried	256,165,076	220,037,370	+16.4
Statistics per car-mile.			
Gross earnings per car-mile (cents)	33.9	29.3	+15.0
Net earnings per car-mile (cents)	19.0	16.6	+14.4
Number passengers per car-mile	9.26	8.86	+4.5
Car-miles per passenger	0.108	0.113	—4.3
Operating ratio — per cent	43.7	43.4	+0.3
Rolling stock owned:			
Passenger cars	553	529	+4.4
Passenger trailers	480	457	+5.0
Freight cars	85	85	
Freight trailers	126	126	
All others	15	14	+7.1
Total equipment	1,259	1,211	+4.0

STATISTICAL INFORMATION SAO PAULO TRAMWAY, LIGHT & POWER COMPANY

Year ended Dec. 31	1919	1918	Percentage Change
Gross earnings	$6,940,000	$5,710,000	+21.6
Net earnings	$4,445,000	$3,800,000	+17.0
Miles of single track	143.43	142.85	+0.6
Car-miles	10,821,370	10,218,314	+5.9
Number passengers carried	76,087,246	63,429,063	+20.0
Statistics per car-mile			
Gross earnings per car-mile	64.2	55.8	+15.8
Net earnings per car-mile	41.1	37.2	+10.5
Number passengers per car-mile	7.3	6.2	+17.7
Car-miles per passenger	0.142	0.161	—11.8
Operating ratio per cent	64.0	6 6	—2.6
Rolling stock owned:			
Passenger cars	305	304	+0.3
Passenger trailers	56	48	+16.7
Freight cars	56	58	—3.5
Freight trailers	36	37	2.7
Total equipment	453	447	+1.3

Lower Interest Rates Here, Says Banker

Public utility corporations are now able to obtain loans at rates considerably lower than was the case a few months ago, according to a recent statement by E. W. Niver of Halsey, Stuart & Company, New York bankers. Regarding the general outlook for utilities, Mr. Niver said:

> At this time banking houses are purchasing long-term securities of high-grade companies to sell on a 7.5 to 8 per cent basis that they could not have considered five months ago owing to market conditions which existed at that time. One of the best indications of the present trend is the increasing demand on the part of investors and dealers for utility securities. While the present market cannot be termed a "utility market," there is, nevertheless, a very noticeable inclination on the part of investors to favor this class of security rather than other issues which have been popular during the past two or three years.
>
> An electric utility which might have had difficulty six months ago in putting out securities at a net cost of 10 to 12 per cent can now obtain money at approximately 9 per cent, and in case of a long-term issue of two or three million dollars the net cost would be somewhat lower. In other words, money is costing 2 to 3 per cent less than last spring, when the utilities could do only short-term financing, for which they paid as high as 13 per cent in some instances.
>
> There is no one particular reason to which can be assigned the improved demand for the issues of electric utilities. The fact that public service commissions are granting rate increases and inserting coal clauses in contracts has strengthened the position of the companies. Another important factor is the work which the utilities themselves have done in improving public relations by putting their case squarely before the public. The policy of customer ownership has been the best thing that they could have adopted. It has resulted in the sale of millions of dollars' worth of preferred stock widely distributed, and many of these small preferred stockholders are now buying utility bonds.
>
> With the increasing demand for utility securities investment bankers are able to give more favorable consideration to new issues, and the natural result, as has already been shown, will be cheaper money for the public utility companies.

Decision Against Original Cost Theory

Judge Van Valkenburgh Considers Present Fair Value Correct Basis for Rate Making

Judge Arba S. Van Valkenburgh in the Federal Court at Kansas City, Mo., granted an injunction on Nov. 10 restraining the Public Service Commission of Missouri from enforcing its order fixing fares on the railway lines of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo. The grounds of the court's opinion are the wrong methods used by the commission in valuation—specifically, the use of original cost figures, and standards of prices of a past period, and of a pre-war period. The Missouri Public Service Commission is said to be preparing to appeal to the Supreme Court from Judge Van Valkenburgh's finding. Members of the commission are quoted as saying that if this opinion is allowed to stand the whole system of rate making by the commission, affecting many utilities, must be made over.

IN HIS opinion Judge Van Valkenburgh points out vital discrepancies in the order of the commission as based on its valuation. He suggests that the company's funded debt is $5,805,000—practically the amount on which 5.4 per cent earnings is permitted by the commission. He goes at length into a discussion of the "present fair value" as the correct basis for rate making and concludes that since present fair value was not sought by the commission its resulting computations necessarily reduced the total valuation so substantially as to make the rates based thereon inadequate and practically confiscatory.

CASE STARTED IN 1919

In the summer of 1919 the St. Joseph Railway, Light, Heat & Power Company filed with the Public Service Commission an application for an order allowing it to charge a straight 8-cent fare in lieu of the 5-cent fare then charged and collected by it. It also asked permission to charge increased rates for steam heat. The company made no request for an increase in its light or power rates.

On Oct. 1, 1919, the commission heard evidence in support of this application. A further hearing was held on Oct. 10, 1919. The matter having been submitted to the commission upon the evidence heard and upon the briefs of counsel the commission on Nov. 20, 1919, made its report and order allowing the complainant a maximum cash fare of 7 cents, with ticket fares of two for 13 cents and for passengers between five and twelve years of age a cash fare of 4 cents, or ticket fares of eight for 26 cents. The commission refused to allow any increase in the complainant's rates for steam heating.

VALUATION PLACED AT $5,800,000

The commission's engineers and accountants valued the applicant's property as a whole at $5,784,883; its railway department at $3,388,436; its light and power department at $1,786,814; its Savannah Interurban property at $33,250, and its steam heating department at $276,360. Substantially adopting these figures the commission in its report and order fixed the value of complainant's property as a whole for rate-making purposes at the sum of $5,800,000; its railway department at the sum of $3,395,000, and its steam-heating department at $197,500. Upon this valuation the commission said in its report:

> Table No. 6 shows that the property as a whole earned an amount during the year ended June 30, 1919, equivalent to 2.67 per cent on $5,800,000 for return, surplus and contingencies.
>
> It is estimated that under the increase in fares granted herein the property as a whole will earn an amount equivalent to 5.4 per cent on $5,800,000 for return, surplus and contingencies. We are confident that this return can be increased through increased operating efficiency of the generating plant, and by the increased use of one-man cars.

Against the values found by the commission just noted the company has an authorized capital stock of $6,000,000, consisting of $2,500,000 of preferred stock and $3,500,000 of common stock. It has a funded debt comprising first mortgage bonds, first and refunding bonds and car service trust certificates aggregating $5,805,000.

In its interpretation of the facts before the court Judge Van Valkenburg ruled as follows:

> It may be stated in passing that a return of 5.4 per cent, which must provide also for surplus and contingencies, has not been regarded by courts and commissions generally as a reasonable return for a public utility, and still less so now under existing conditions. The commission apparently looks for some indefinite increase of this percentage through changed methods of operation suggested by the commission. This is, of course, entirely speculative, and the principle falls nearly, if not quite, within the disapproval of the Supreme Court and of this court as constituting an invasion of the right of the company to conduct and manage its own affairs, subject to a proper exercise of the power of regulation. (Kansas City, C. C. & St. J. Ry. vs. Barker, 242 Fed. 310, and cases cited.)
>
> ### VALUES DIFFERED BY $5,721,639
>
> The engineers and accountants for complainant, as shown by the record, valued the complainant's property as a whole at $11,521,639; the railway department at $7,195,333; the Savannah Interurban property at $5,888,392; the light and power department at $3,228,362, and the steam heating department at $509,552. We thus find a difference in total valuation between $11,521,639, tendered by complainant, and $5,800,000, adopted by the commission for rate making purposes, or $5,721,639.
>
> The complainant's figures are arrived at upon the basis of present day reproduction cost without depreciation. The commission took the original cost when obtainable, and when not obtainable average prices for a fixed period of five years before war prices prevailed; going back approximately to the year 1910. It also allowed cost price for additions and betterments made since present prices have prevailed, but it appears that no improvements or betterments of consequence have been made since that time. It will be observed that the valuation fixed by the commission barely exceeds the complainant's funded debt; so that the return expected by the commission to be earned by complainant at 5.4 per cent, if realized, would substantially cover only the interest upon such indebtedness.
>
> There was no substantial difference of opinion between complainant's engineers and accountants and the engineers and accountants for the commission except as to the method of valuation and as to the question of what would constitute a reasonable return upon any given valuation. It was conceded at the argument that complainant's figures were correct upon their theory, and that the commission's figures were substantially correct upon the theory upon which they proceeded; therefore, while complainant's valuation may be too high, because no allowance is made for depreciation and elements of reduction uniformly recognized, nevertheless there must remain a very large amount of valuation to which complainant would be entitled unless the standard adopted by the commission is the correct one, which would have a decisive effect upon the reasonableness of the return possible from the rates allowed by the commission.
>
> ### VALUATION THE ONLY CONSIDERATION
>
> It seems unnecessary to consider any phase of this case except that of valuation, because, in my judgment, that consideration is conclusive upon the reasonableness of the present rates. Complainant, in its bill, charges that the same are inadequate, unreasonable and confiscatory, and prays injunctive relief against their enforcement. Of course the power of this court is limited to an adjudication upon this point, it being invested with no rate making power.
>
> It is my judgment that the great weight of authority is against the adoption of a standard of original cost as a controlling basis for determining present value. The present fair value is the object to be attained. Nor do I think it permissible substantially to restrict the inquiry to a period antedating present cost prices. In Joplin & Pittsburg Railway vs. the Public Service Commission of Missouri, et al, in this same division of this court, before Stone, Circuit Judge, Wade, District Judge, and the writer of this opinion, we said:
>
> "It appears upon the face of the report (of the commission) that great, if not undue, emphasis was laid upon the original cost of the property * * * at a period greatly antedating that with which this investigation must deal; nor can we say that the present period of high prices is so temporary or abnormal that it may practically be disregarded in arriving at the value of complainant's properties. No one can say what degree of depression may ultimately come, but it is reasonably certain that the cost of the properties now under consideration will never again approximate figures prevailing in the years before the world war."
>
> The Supreme Court of New Jersey, in an opinion filed on Aug. 7, 1920, in the case of Elizabethtown Gas Light Company vs. Board of Public Utility Commissioners, still further elaborates this view, citing Lincoln Gas Company vs. Lincoln, 250 U. S. 256 in support of its conclusions.
>
> "In the very recent case of the United States ex rel. Kansas City Southern Railway vs. Interstate Commerce Commission, decided by the Supreme Court on March 8, 1920, it appears that Congress has given legislative recognition to this same principle, and the court ordered the commission to make its valuation in compliance with the act of Congress. While the decision in that case was predicated upon the express provisions of the act, nevertheless we find in it a recognition, both by Congress and by that court, of the necessity of adapting the standard of rate making bodies to conditions existing at the time the power is to be exercised."
>
> It follows that the method of valuation adopted by the commission in the case a bar was wrong, and that the resulting computation necessarily reduced the total valuation of complainant's property so substantially as to make the rates based ther on inadequate and practically confiscatory For this reason it will be unnecessary t resolve other questions presented by th briefs. By common consent this was deeme the crucial question. The court does n undertake to lay down any hard and fas rule in the premises. Many elements mus enter into the final determination of a question of this nature. It is sufficient tha the procedure disclosed by this record lead unavoidably to the conclusion that the relie prayed must be granted. It is so grante

The issuance of the injunction ha been the source of some confusion a to the position in which the St. Josep fares stand. Company officials assumed that the injunction permitte them to charge a higher rate than cents, and preparations were therefor made to install a straight 10-cent ra on Nov. 18.

When it became known on Nov. that the company purposed to charg 10 cents, beginning Nov. 18, the ci officials, speaking in the name of the prosecuting attorney of Buchanan County, with his consent, brought a petition for injunction to Judge Allen of the State Court. Late in the afternoon of that day the injunction was granted, restraining the company from charging more than the rate established by the Public Service Commission (setting forth these rates specifically and not stating that they were the rates established by the commission), the injunction to prevail until further ordered by this court or by the Public Service Commission. This action stopped the steps toward immediate fare increase based on the Federal Court opinion.

COMPANY SOUGHT TEN-CENT FARE

Meanwhile representatives of the city suggested that the commission put into effect a temporary rate, lower than the proposed 10-cent fare. A majority of the commission responded to this request with a formal statement that the commission maintained the justness of its processes of ascertaining values for rate-making purposes. Chairman Busby of the commission dissented from this opinion, however, and in a statement intimated his belief that in view of the Federal Court's opinion the commission should proceed to fix a new rate.

Some time previous to the issuance of the injunction by Judge Van Valkenburgh, the company sought a 10-cent fare from the Public Service Commission. After the injunction was issued the company renewed its petition to the commission for hearings looking toward the fixing of higher fares. The matter was now becoming so complicated that both the city and the company were eager to discover an expedient for avoiding continuous passages in courts. A compromise was therefore proposed under which slightly increased fares might be charged pending the further consideration of the matter by the commission and the hearing of the commission's appeal from Judge Van Valkenburgh's decision to the Supreme Court. It had also been suggested that the Federal Court's opinion might be so modified as to enable the Public Service Commission to fix a new rate without technically incurring a charge of contempt of court and without entirely revising its methods of valuation.

Further steps in St. Joseph depend, it is reported, on the consent of the company's owners in New York to the acceptance of a fare lower than 10 cents. The utilities commission is said to be ready to grant an immediate hearing in case Judge Van Valkenburgh's order is so modified that the commission would not be in contempt by fixing a higher rate without a new valuation. Judge Van Valkenburgh would, it is reliably reported, modify his order to allow a new rate to be fixed as suggested though such order would not be a recession from his finding as to the commission's wrong basis of valuation, and the commission would proceed with its appeal from the present injunction order to the Supreme Court. The city officials of St. Joseph, the members of the commission and the attorneys of the company are said to have agreed on the wording of a new order acceptable to them, but such modified order has not been presented to Judge Van Valkenburgh for action by him.

Passenger Receipts Decrease

An analysis of the reports of Howard C. Foss, receiver for the Savannah (Ga.) Electric Company, shows an apparent falling off in passenger receipts since the 7-cent fare went into effect. Passenger receipts for August were $72,396 and ticket sales were $23,927, a total of $95,423. For the month of September passenger receipts were $70,610 and ticket sales $22,468, a total of $93,979, which shows a decrease of $1,785 in passenger receipts and $558 in receipts from ticket sales.

Following is the detailed report of the receiver for the month of September:

Receipts:		
Cash on hand and in banks Aug. 31, 1920		$155,608
Passenger receipts	$70,610	
Ticket sales	22,468	
Freight and express receipts	427	
Light and power receipts	67,286	
Accounts receivable, miscellaneous	3,413	
Miscellaneous	2,970	161,177
		$322,786
Expenditures:		
Salaries and wages	$47,676	
Supplies	7,724	
Supplies, fuel	17,044	
Accidents account	3,887	
Taxes	8,104	
Sundry interest	8	
Refunds on deposits	258	
Other miscellaneous operation	27,305	112,008
Cash on hand and in banks Sept. 30		$210,777

NOTE — This is a cash statement and makes no provision for even the large items, such as payrolls, taxes and interest on bonds until actually due and paid. No provision whatever is made for the interest on coupon notes, bank notes, etc., nor for dividends on any stock nor extraordinary items, depreciation, replacements and obsolescence.

Glasgow Has Small Surplus for Quarter

An interesting statement on the finances of the Glasgow (Scotland) Corporation Tramways was made on Sept. 29 by Councillor Kelly, convener of the tramways committee. The revenue from the increase of fares had, he said, exceeded expectations. During the first quarter of the current financial year, from June 1 to Aug. 31, the revenue amounted to £559,770. The working expenditure for the same period was £444,585, leaving a gross balance of £115,185. Deducting from this depreciation and renewal allowances, income tax, etc., there remained a surplus for the three months of £45,165. From this there had to be deducted, however, a quarter of last year's deficit, amounting to £27,000, and an additional sum to renewals fund of £14,700, so that the actual surplus was only £3,915. The top of the working expenses had not been reached, as demands for increased wages were coming forward. If concesions were made, the fares would have to be further increased.

Electrification Urgent

Great Growth of Traffic Makes Immediate Action Necessary in New South Wales

The latest report of the New South Wales Government Railways & Tramways shows such heavy gains in both steam suburban and local street railway traffic that the matter of electrifying the former lines, comprising 400 single-track miles, has become acute. Plans for electrification, as described in the ELECTRIC RAILWAY JOURNAL for March 3, 1917, have been held up because of the war, but it is expected that construction will begin at an early date. The necessity for this may be judged from the fact that the steam traffic increased from 77,817,452 passengers in the fiscal year ended June 30, 1915, to 101,428,991 in the year ended June 30, 1920, or roughly 30 per cent. So, too, the local electric street railway traffic (City & Suburban Lines only) increased from 240,545,317 to 269,255,935, or about 12 per cent.

As a matter of fact, the tramways had a severe slump during part of the war, but the recovery has been rapid, judging from the fact that the City & Suburban Lines had carried but 222,111,451 passengers in the fiscal year 1919, so that the 1920 figures show an increase of more than 20 per cent. This increase occurred in spite of a fare rise on Jan. 1, 1920.

CITY AND SUBURBAN LINES PROFITABLE

The City & Suburban Lines, which constitute the principal street railway system of Sydney, compare as follows for 1920 and 1919, figures for the latter year being in parentheses: Trackage, 207.1 miles single track; revenue passengers as above; car-miles, 21,811,695 (20,094,167); gross earnings, £2,370,309 (£1,832,911); operating expenses, £199,070 (£1,481,332); earnings per car-mile, 26.08d. or 52.16 cents (21.89d. or 43.78 cents); expenses per car-mile, 21.90d. or 43.8 cents (17.69d. or 35.38 cents); operating ratio, 83.96 per cent (80.82 per cent); return on investment, 5.86 per cent (5.48 per cent).

However, the actual tramway mileage in the Sydney district is greater than the foregoing would indicate, as there are lines at North Sydney and in various thinly settled suburbs. Subtracting the returns of the Newcastle, Broken Hill and Maitland lines, which are not in the metropolitan district, gives a total of 300 miles single track. Passengers for the combined tramways were approximately 95 per cent of the grand total of 324,884,651 (268,797,814). About 94 per cent of all tramway mileage (26,889,077 car-miles in 1920, against 24,674,306 car-miles in 1919) was made in the Sydney district. While the City & Suburban Lines made money, as indicated, the result of all tramway operations, including sparsely patronized steam lines, was a deficit of £6,449 on £2,881,797 gross earnings. The number of rides per inhabitant per annum exclusive of ferries is now close to 500.

Financial News Notes

Seeks $5,000,000 Stock Issue. — The Pacific Gas & Electric Company, San Francisco, Cal., has applied to the State Railroad Commission for permission to issue stock for $5,000,000, the proceeds to be used for hydro-electric power plant construction and development work.

Voters Approve P. R. T. Loan. — A municipal loan to the Philadelphia (Pa.) Rapid Transit Company has been approved by the voters of the city. The loan will make available $3,500,000 for completing and equipping the Frankford elevated line, now under construction. The city is still negotiating with the Philadelphia Rapid Transit Company with a view to the operation of the new line by the company.

Ten-Year Notes Offered.—Bonbright & Company, Inc., New York, N. Y., are offering for subscription at 96 and accrued interest, yielding more than 8.60 per cent, $2,250,000 of ten-year 8 per cent bond-secured sinking fund gold notes of the Pennsylvania-Ohio Power & Light Company, Youngstown, Ohio. The bonds are dated Nov. 1, 1920, and are due Nov. 1, 1930. The securities are among the issues included in the plan for the recapitalization of the utility properties at Youngstown, dealt with at length in the ELECTRIC RAILWAY JOURNAL for Nov. 6, page 985.

May Allow Abandonment.—The Ohio Public Utilities Commission has served notice on the city authorities of Findlay that, unless they can come to an understanding with the Toledo, Bowling Green & Southern Traction Company, Findlay, before Dec. 17, the company will be permitted to abandon service on its local lines. The railway some time ago notified the city officials that it must have financial relief. An ordinance was then passed granting the company an increase in fare from 5 cents to 10 cents. This measure was subsequently repealed. The company then applied to the State Public Utilities Commission for authority to discontinue service.

Betterment Funds Not Available.—In a recent opinion Assistant Corporation Counsel Robert H. Evans of Seattle, Wash., ruled that the use of the betterment fund moneys for reconstruction of cars for one-man operation and for the replacement work at Second Avenue and Pine Street is not authorized under the bond ordinance creating the fund. D. W. Henderson, superintendent of railways, had considered using the betterment fund cash to pay for these two items, totaling about $60,000, but the ordinance did not specifically refer to these improvements and an opinion was asked.

Additional Payment Contested. — Judge Johnson, sitting in an equity session of the United States District Court in Boston, Mass., has been hearing a case to set aside an award of $250,000 to Patrick McGovern, a New York contractor, against the city of Boston and the Boston Transit Commission for additional expenses incurred over original estimates in the construction of the Dorchester tunnel. The award was made by Judge Remick, sitting as master for the Federal Court. The case now up was originally brought in the state courts, where a decision was made against payments to Mr. McGovern. This was reversed in the Federal Court, however, in an opinion handed down last January.

Public Service Shows Deficit.—The operation of the Public Service Railway, Newark, N. J. for the month of September shows an actual deficit of $104,495, without making allowances for depreciation. Gross receipts totaled $2,280,500, while operating expenses totaled $2,384,996. During September the company's cars traveled 4,988,062 car-miles and carried 38,082,527 passengers. Wages in the transportation department alone amounted to $148,700 more than during the same month a year ago; power cost $72,651 more than in September, 1919, while taxes exceeded those for the same month of last year by approximately $24,000. The deficit of the company for the last three years, including allowance for renewal of equipment, is given as $888,323 for 1918, $1,514,735 for 1919, and $1,247,217 for this year, November and December figures being estimated. The total for the three years is shown to be $3,650,276.

"L" Payment Protested.—The constitutionality of the act of the Massachusetts Legislature of 1918 which provided for public operation of the Boston Elevated Railway for a period of ten years, is attacked by the city of Boston. The city is seeking to recover $2,905,930 paid to the Commonwealth under protest on Nov. 15, 1919, as its proportion of a deficit of about $4,000,000 declared to have existed on July 1, 1919. It is claimed by the city that in ascertaining the deficiency the trustees charged for depreciation in the twelve months ended June 30, 1919, about $2,000,000 for maintenance and repairs notwithstanding that the average amount charged by the company for depreciation during the ten years prior to July 1, 1918, was about $98,000 per annum, and that the deficit of $4,000,000 is therefore unreasonable and excessive. The case was argued recently before the full bench of the Supreme Court.

Colorado Company Sells Bonds.—H. M. Byllesby & Company are offering for subscription at 96 and accrued interest to yield more than 8 per cent an issue of $1,400,000 first and refunding mortgage 7.5 per cent bonds of the Arkansas Valley Railway, Light & Power Company, Pueblo, Col., due Nov. 1, 1931. These bonds are a direct obligation of the company and are secured by a first mortgage on the entire property, subject only to an underlying issue of $1,647,000 in bonds on that part of the property formerly owned by the Pueblo & Suburban Traction & Lighting Company. A sufficient amount of the 7.5 per cent bonds has been set aside to retire the underlying bonds which mature Oct. 1, 1922. At that time the new issue will become an absolute first mortgage on the entire property. These bonds, together with $600,000 in 8 per cent notes, will provide funds for extensions and improvements to the property and will retire $1,684,900 in other obligations.

$2,000,000 Issue of Gold Notes.—Bonbright & Company, Inc., New York, N. Y., are offering for subscription at 97 and interest to yield about 8.45 per cent $2,000,000 of ten-year 8 per cent bond-secured gold notes of the United Light & Railways Company, Grand Rapids, Mich. The notes are dated Nov. 1, 1920, and are due Nov. 1, 1930. It is explained that the company operates nineteen public utilities, mainly electric and gas, which it owns or controls, supplying without competition fifty-five prosperous manufacturing and agricultural communities, located in the heart of the Middle West. These notes will be the direct obligation of the company and will be secured by first and refunding mortgage 5 per cent bonds of the company, due on June 1, 1932, in the ratio of 133⅓ per cent of bonds to each 100 per cent of notes outstanding, or by cash equal to the face amount of the notes.

$4,200,000 of St. Louis Certificates.—The Guaranty Company, New York, N. Y., is at the head of a syndicate of bankers which offered for subscription on Nov. 23 at 97.48 and interest to yield about 8 per cent $4,200,000 of United Railways, St. Louis, Mo., receiver's three-year 7 per cent certificates of indebtedness. The certificates are dated Oct. 1, 1920, and mature Oct. 1, 1923. The present issue is known as Series A. The proceeds will be applied toward the payment of $1,900,000 of St. Louis Railroad first mortgage 4½ per cent bonds due May 1, 1920, and to reimburse the receiver for funds used to retire $2,300,000 one-year 6 per cent certificates of indebtedness of the receiver of the United Railways paid on Sept. 2, 1920. These certificates are to be a first and prior lien on 277 miles of street railroad, of which 79 miles were formerly mortgaged by the St. Louis Railroad and the Union Depot Railroad. They are also to be a lien, subject to $10,600,000 divisional bonds all maturing before this issue, on the remaining property and franchises of the United Railways including 184 additional miles of track. These certificates rank prior to $30,300,000 of first general mortgage 4 per cent bonds of the United Railways and $9,790,000 junior bonds, upon which interest has always been paid. The United Railways controls without competition all the local electric railways operating in St. Louis.

Traffic and Transportation

One-Man Cars Approved

Massachusetts Board Refuses to Bar Rebuilt Double-Truck Cars—Carmen Seek Injunction

Double-truck one-man cars can be legally operated in the State of Massachusetts, according to an opinion handed down on Nov. 8 by the Massachusetts Department of Public Utilities. The department has dismissed a petition that the operation of such cars by the Eastern Massachusetts Street Railway, Boston, be prohibited. The company and all other railways having cars of this type in use are directed to install safety devices on all such cars before May 1 next. The department has prescribed a number of regulations to be followed by the railway in car operation.

William J. Murphy and other members of the joint conference board representing the employees of the Bay State system, have applied to the State Supreme Court for an injunction to restrain the company from operating cars of this type. The Bay State management has announced that it will discharge all men detected in the act of spreading propaganda against the one-man cars.

MEN OPPOSE OPERATION

The operation of rebuilt double-truck cars by one man has for some time been a disputed question between the management of the Eastern Massachusetts system and its employees. The men have contended that the use of such cars endangers both the car operators and the public. They also strongly object to the introduction of the one-man cars on the ground that many of their number are thus deprived of work. A majority of the cars now in service are operated by one man.

The most vehement protest came from the carmen of the company's Fall River division. A controversy arose some time ago when the company first proposed to install cars of the rebuilt type. The men did not object to the use of one-man cars with but a single truck, but did object to double-truck cars being turned into one-man cars even with such apparatus installed as would be necessary to make the scheme feasible. Several meetings of the employees were held to decide on the policy the union would follow should the cars be placed on the lines, and at a meeting held about Oct. 15 it was decided to strike. On Oct. 31 another meeting was held, at which James H. Vahey, counsel for the Amalgamated Association, urged the men to reconsider their action. It was later decided to postpone action pending a ruling from the Department of Public Utilities.

In refusing the petition the department said:

> The petitioners allege that the cars now operated are a "menace to public safety." With this we do not concur. Safety is a relative term and just how far safety devices should be required at a particular moment and just how much the car rider should be called upon to pay for that insurance is a practical question dependent upon actual conditions as they exist. We feel it our duty, therefore, to say affirmatively that the one-man cars in question are not in our opinion "menaces" as characterized in this petition and that we do not think that either passengers or operators should, until the rules mentioned above go into effect, feel apprehensive as to the safety of the cars as now operated.

SAFETY REGULATIONS PRESCRIBED

Summarized, the regulations for safety are as follows:

> Every (subway) car or train shall be equipped with a lighted headlight, together with a reflector, so as to illumine the roadway in advance of the car or train.
>
> Every street railway car operated on a surface line shall be equipped with wheel guards across the front and rear of each truck.
>
> Every street railway car shall be equipped with hand brakes, at all times in good working order, effective when applied from either end of the car.
>
> Every car operated on the surface lines shall be equipped with mechanical devices for distributing sand on the rails, maintained so as to be of immediate service to the operator of the car at any time.
>
> Every one-man car shall be equipped with one or the other of the following devices: One so designed and maintained that upon the release of the controller of the car by the motorman the motive power will be cut off and the brakes will be applied; together with a device, located in a conspicuous place and accessible to passengers, by the operation of which a door at the rear of the car will be unfastened. Another, located in a conspicuous place and accessible to passengers, by the operation of which the motive power will be cut off, the brakes applied, and a door at the rear of the car unfastened.
>
> Instructions as to the location of the safety devices accessible to passengers and their use in an emergency must be posted in a conspicuous place in the car.
>
> Emergency lifting jacks must be installed.

May Grant Eight-Cent Fare

An ordinance is now under consideration by the City Commission of Grand Rapids, Mich., providing for an increase in the fare of the Grand Rapids Railway from 7 cents to 8 cents. Under the terms of the measure the company will be permitted to sell four tickets for 30 cents and fifteen for $1. The railway recently applied to the commission for a 10-cent cash fare with four tickets for 30 cents.

Counsel for the company, testifying at a recent hearing before the commission, declared that the company was not seeking for a return on its investment but only for revenue to meet current operating expenses. He said that the loss for the period from June 30 to Sept. 30 was about $17,000. The total deficit now approximates $204,000. Beginning on Sept. 1 last the railway increased the wages of its employees 9 cents an hour, thus adding $9,000 monthly to the operating cost. The carmen are now receiving 60 cents an hour.

Terminal Increase Sought

Indianapolis Street Railway Seeks Advance in Trackage Rates Paid by Interurbans

The Indianapolis (Ind.) Street Railway on Nov. 17 filed with the State Public Service Commission a petition for a readjustment of the rates paid by interurbans entering Indianapolis for the use of tracks and terminal facilities owned by the company. The petition does not ask for a specific increase, leaving the fixing of equitable rates in the hands of the commission.

The city of Indianapolis recently applied to the commission for authority to withdraw its petition for a service-at-cost franchise for the Indianapolis Street Railway. The railway immediately asked the commission to allow it to charge 2 cents for each transfer. The company now states that the city has indicated that it will oppose the granting of a transfer charge on the ground that the rates received by the company from the interurbans are inadequate.

INTERURBANS' TERMINAL RIGHTS

It points out that the interurbans entering Indianapolis are dealt with on equal terms, that each company has the use of the passenger and freight terminal and of certain lines of track for all passenger, freight and express cars entering the city. The petitioner points out that contracts are made with the companies under a special act of the State Legislature and with the approval of the city. The contracts are to continue in force until April 7, 1933, when the railway's franchise expires.

Attached to the petition are extracts from contracts with the interurban companies, which show that 4 cents is charged for each passenger on interurban lines, except the Broad Ripple and the Beech Grove lines. On the Broad Ripple line a charge of 2 cents is made for each passenger and a charge of 3 cents is made on the Beech Grove line. In addition 4 cents is charged for each piece of baggage for which the passenger pays transportation. The freight charges are 75 cents a round trip plus 15 cents a car-mile.

An attached statement shows the revenues from these charges totaled $310,644 in 1919 and $239,367 during the first nine months of 1920. The 1919 revenues are divided by companies as follows: Union Traction Company, $101,827; Terre Haute, Indianapolis & Eastern Traction Company, $135,727; Interstate Public Service Company, $42,386; Indianapolis & Cincinnati Traction Company, $24,143; Beech Grove Traction Company, $6,559.

The revenues received from the interurbans for the first nine months of 1920 were divided as follows: Union Traction Company, $63,406; Terre Haute, Indianapolis & Eastern Traction Company, $117,315; Interstate Public Service Company, $33,157; Indianapolis & Cincinnati Traction Company, $20,446; Beech Grove Traction Company, $5,041.

New York Commission Overruled

Interstate Commerce Commission's Order Raising Intrastate Passenger Fares Hailed as Blow at States' Rate-Making Powers

A decision of far-reaching consequence for all carriers under the jurisdiction of the Interstate Commerce Commission was handed down by that body on Nov. 18. The commission overruled an order of the Public Service Commission for the Second District of New York, refusing to allow the increase on intrastate passenger rates granted to interstate carriers under the terms of the Esch-Cummins act. The federal commission directed that passenger fares on intrastate traffic be raised to the same level as those on traffic crossing the state line. This is taken to mean that roads operating wholly within a state may charge the same rates as those engaged in interstate business. The ruling of the Interstate Commerce Commission will be immediately appealed by the New York commissions. The National Association of Railway and Utilities Commissioners is also expected to ask leave to intervene in the litigation on the ground that the power given the state commissions by their Legislatures to control public service corporations is in peril. The case will ultimately reach the United States Supreme Court.

THE opinion of the federal commission, which will soon be followed by similar decisions in cases from Illinois and other states where intrastate rates have not been raised to the level of the new interstate tariffs is expected to precipitate a great legal battle to test the right of the federal government through the Interstate Commerce Commission to interfere with the prerogative of the individual states to deal with intrastate rates. The action of the federal commission challenges the right of the states to deal with railroad rates, for it takes the position that under the provision of the new railroad act, state commissions and state laws fixing intrastate rates are subordinate to the mandate of Congress that rates shall be allowed which will yield 5½ to 6 per cent return.

STATES' RIGHTS AT ISSUE

If the Interstate Commerce Commission is sustained by the Supreme Court in this, the first decision of such a sweeping character involving a claim of broader power over the rates of roads wholly within state lines, the difficulty will be remedied which is confronting the roads in their efforts to obtain sufficient revenue to meet increased costs, without bringing the return to the roads below 5½ to 6 per cent on their investment. But if the court fails to sustain the commission and holds that those states which have failed to bring all their freight and passenger rates up to the new interstate commerce levels, were justified in such refusals, then the individual states will be able to install lower rates on traffic wholly within their borders.

Under the ruling of the federal commission, the roads in New York State will raise their intrastate passenger rates to 3.6 cents a mile, this being the level at which interstate passenger rates have been permitted by the commission for interstate passenger travel. The state commission has already granted the increases in intrastate freight traffic, except milk.

The Interstate Commerce Commission refers in its opinion to the decision in the Shreveport case, which held that it had power over intrastate commerce, so far as it affects interstate commerce. While this principle, upheld by the Supreme Court, "continues to be our guide," the commission says, it considers the New York case in the light of the fact that the commission's position has "been put in the form of a mandate" by the Esch-Cummins act. The commission holds that "most cogent reasons" for an extension of authority have been supplied by the situation in which the transportation interests of the country have been placed.

COMMISSION'S STAND EXPLAINED

The commission points out that the decisive factor in this case is "whether the rates under consideration injuriously affect intrastate commerce." It shows that Congress directed that rates be allowed which would yield 5½ to 6 per cent return on the value of the property. The commission continues:

> There can be no doubt of the power of Congress to devise and provide for carrying into effect a plan for assuring the nation's interstate railroads a fair return on the value of their property; and the full control of Congress in this matter is not to be denied on the ground that the carriers' aggregate earnings are a combining of intrastate revenue and interstate revenue.

Of passenger fares, the commission says that the record leaves no doubt as to the "unduly preferential character of the intrastate fares and charges now in effect in the State of New York." The commission says further:

> The record shows beyond question, that there are no transportation conditions in the State of New York that justify lower rates or fares on the whole than those applicable in neighboring states, or lower than the interstate rates and fares between points in New York and points in other states.

COMMISSIONER BARRETT PROTESTS

Alfred M. Barrett, Public Service Commissioner for the First District of New York, declared that the decision of the federal commission "is one of the greatest blows the doctrine of state rights has ever received." He contended that if the decision be upheld on appeal, it will be possible for the Interstate Commerce Commission to regulate any rate in the state where the claim is made, either that the railroad is engaged in interstate commerce, or that the rates of a local road are lower for a similar service than a line engaged in interstate commerce.

James M. Walker, secretary of the New York commission for the First District, and secretary of the National Association of Railway and Utilities Commissioners, also issued a statement. Mr. Walker pointed out that the ruling of the federal commission struck at the root of the states' powers.

Legislative Action Urged

At the annual meeting of the Connecticut Chamber of Commerce in New Haven on Nov. 10, recommendations regarding the state electric railway situation were made to the board of directors of the organization. The public utilities committee advised that the state chamber suggest to the Connecticut General Assembly that laws be enacted to bring about:

1. A new system of taxation for trolleys and jitneys so that all common carriers doing a similar business shall be similarly taxed.
2. Abolition of paving requirements imposed on electric railways.
3. Abolition of bridge building and maintenance requirements.
4. Supervision by municipal authorities subject to appeal to the Public Utilities Commission of jitneys as to routes, schedules and fares.
5. Authority for trolley companies to abandon certain lines which cannot hope to be self-sustaining.
6. Authority for municipalities to make service-at-cost contracts with electric railways after state appraisal.
7. Authority for municipalities to subsidize electric railways by a general municipal tax or by assessment upon property immediately benefited.

Seven Cents Not Enough

The Houston (Tex.) Electric Company, operating the electric railway system in Houston, is not earning the 8 per cent return authorized under the decree of the United States District Court that held the former fare ordinance of the city of Houston insufficient and confiscatory. This fact was disclosed by Luke C. Bradley, district manager for Stone & Webster, in a formal statement recently before the City Commission. W. E. Wood, manager for the Houston Electric Company, substantiated Mr. Bradley's statement. The company is now charging a 7-cent fare under authority of the court.

Mr. Bradley disclosed that during August the company earned 6.8 per cent on the agreed valuation, which, he said, left a deficit of $5,699 from the authorized return of 8 per cent. This means a deficit of $68,400 for the year, he said. At the same time, he declared, maintenance costs have advanced $313,000 for the year.

Mr. Bradley intimated that either the fare must be increased from 7 cents to 8 cents or possibly 9 cents, or the city must enact legislation to halt the operating of the jitneys. Jitneys have continued to operate in Houston despite all legislation directed against them, and they have cut deeply into the revenue of the railway. When the fare was raised to 7 cents, the jitneys continued to charge only 5 cents and as a result the traction company has lost many passengers. After the meeting with Mr. Bradley, Mayor A. E. Amerman told the City Commission that the jitneys must be restricted.

Commission Backs Railway Against Buses

Connecticut Board Upholds Right to Suspend Service If Competition Continues—Cars Run in Waterbury Pending Settlement

The question of whether the Connecticut Company may legally withdraw service from any city in the State because of jitney competition, came before the State Public Utilities Commission for decision at a hearing in Hartford on Nov. 23. The commission had intervened to halt the summary suspension of trolley service in Waterbury on Nov. 17. Following the hearing the railway agreed to continue service in Waterbury for a period of not more than ten days pending action by the city authorities looking to the removal of bus competition. Richard T. Higgins, chairman of the commission, indicated that, unless the city took steps to regulate the jitneys, the utilities board would not oppose the withdrawal of the electric cars. Chairman Higgins declared that "a regulatory body is not warranted in compelling a utility to continue to supply service at an absolute loss."

LUCIUS S. STORRS, president of the company, presented data to the commission showing that the company had suffered a loss in the operation of its Waterbury division totalling $1,146,215 for the entire year of 1919 and the first ten months of 1920. The loss for the ten months of this year was $31,348 more than the total loss for 1919. This total loss for the twenty-two months includes an item of $902,475, the 8 per cent return on the investment. The daily average passenger receipts during November show a continual decrease as the month progresses. The week ending Nov. 5 averaged a daily income of $809 or 18½ per cent less than the receipts for Nov. 1.

JITNEYS CAUSE BIG LOSS

President Storrs told the commission that it was the desire of the trustees to bring to a head in the state the whole question of jitney and trolley competition before cold weather. The company wanted to obtain from the cities of Connecticut an answer to the question of whether or not the jitney should be permitted to run on streets served by trolleys. It was for this reason that the order for withdrawal of Waterbury service was issued last week, Mr. Storrs asserted.

Mr. Storrs summed up the case for the Connecticut Company in the following statement:

> For the period beginning with the day 7-cent fares were collected and extending to the day the original ordinance was made effective the average daily revenue was $3,923 on the whole division. For the period in which the 7-cent fare was collected and the jitneys under regulation the daily average was $4,137, an increase in revenue during that period of the year when earnings are falling off from the higher summer receipts. For the one day the 10-cent fare was collected with full jitney regulation the receipts were $4 372 or $449 per day more than during the summer. Since the jitneys have been fully operating the receipts have averaged but $3.762, or $610 per day less than Nov. 1 and about $160 less than during the summer.
>
> As the summer revenues were not enough to pay for operations at that time it is clear that lower receipts at the period of higher costs will not permit long continued operation. It has, therefore, been necessary to bring the issue to a conclusion now rather than wait for the mid-winter period, when the street car service is so much more necessary and have it fail at that time due to lack of funds.

Chairman Higgins, in outlining the views of the commission, said:

> Possibly at this point the commission would make a suggestion, which is only a suggestion. Some question might arise in this case as to the ultimate jurisdiction of the commission, which we hope will not arise or that the occasion will not arise to bring it up. The commission has already assumed jurisdiction over the subject matter. Having done so we make this suggestion, but first I want to state that the compelling by a state tribunal of a utility company to render service must of necessity depend upon the return to that company being sufficient to warrant its operation. In other words, no tribunal can compel a utility commission to continue service at a continuing loss.
>
> On the other hand this company is chartered to render service in Waterbury and the surrounding territory. The importance of that service to Waterbury and connecting communities is without question. If possible the service ought to be continued. The city of Waterbury passed an ordinance recently which it claims is a restriction upon the jitney competition. The company does not think it is a proper restriction. The ultimate result of that ordinance is not yet known.

FURTHER TRIAL ASKED

> Therefore the commission suggests that the company for a limited time continue its operation under the new ordinance, and, if by virtue of jitney competition it is unable to receive sufficient revenues to warrant its operation, then that a request be made either through the commission or directly from the company—the commission will be willing to act as intermediator in the matter—upon the city of Waterbury for further restriction of jitney competition.
>
> If this is ultimately brought about then it may result in continued street railway service, at least until some possible permanent remedy or regulation may be prescribed by the incoming Legislature. If the losses to the company are going to continue under the ordinance and the city would not make any change we will not pass upon the question other than to say that under the laws pertaining to regulation a regulatory body is not warranted in compelling a utility company to continue to supply service at an absolute loss. This is informally expressed, but the thought is that possibly the company and the city might get together under an arrangement whereby the company shall for a limited time continue service under the ordinance which goes into effect today and see what the result will be, and if that result is not satisfactory to see if some other ordinance may not be passed.

EFFECT OF 10-CENT FARE

To show the effect of the 10-cent fare the company has offered the following figures of gross revenue on the Hartford division of the company's lines. In connection with these statistics it is to be remembered that the 10-cent fare went into effect on Nov. 1 but that the jitneys continued to operate until Nov. 8 as indicated by the increased revenue since Nov. 8. The table follows:

Oct. 1-10	$95,835
Oct. 11-17	64 425
Oct. 18-24	65,257
Oct. 25-31	63,434
Total	$288,954
Daily average	9,321
Nov. 1-7	70,710
Nov. 8-14	73,316
Total	$149,026
Daily average	$10,644

Meanwhile the city of Waterbury is without jitney service. Following the passage by the Board of Aldermen of an ordinance barring the buses from certain streets, the operators withdrew their cars, announcing that no buses would run until the measure had been repealed. They intimated that if further restrictions were imposed by the city they would seek an injunction to restrain the municipal authorities from interfering with their "right" to operate where they chose. The ordinance passed by the Aldermen on Nov. 15 failed to exclude the buses from certain streets containing trolley tracks.

St. Joseph Rate Case Followed Closely

Public utility companies at Kansas City, Mo., are watching carefully the developments in the St. Joseph Railway, Light Heat & Power Company's rate case, in which the method of valuation by the Missouri Public Service Commission is the cause of an injunction restraining the commission from enforcing an order increasing fares.

While attorneys are inclined to agree that the Federal Court cannot fix rates, there is much discussion of the power of the court to allow a utility to charge more than permitted by the commission, such increases to be within reasonable limits—the limits possibly to be set by the Federal Court.

A case is pending affecting a water company, in which the Federal Court set a limit of charges higher than those allowed by the commission. This is in the matter of the Missouri Public Utilities Company, a concern with headquarters at St. Louis, owning and operating many utilities; and affects its Webb City water service property.

The company filed revised schedules with the commission, involving higher charges. The commission "suspended" these. The company sought an injunction against such suspension, and the injunction was granted. The hearing produced evidence and testimony regarding the need for larger revenue, and the petition specified the rates that had been filed with the commission. The order of the court, therefore, put into effect the higher rates. The ruling directly provided that no rates higher than those specified should be charged. These higher charges have been collected since June 29, 1920, without opposition from the commission.

"Safeties" for Springfield

The first of seventeen one-man safety cars to be installed by the Springfield (Ill.) Consolidated Railway has arrived in Springfield and the other sixteen are expected to arrive soon. They were purchased at an expenditure of $117,000. According to announcement of the management the adoption of these new cars will result in no reduction of the present working force, but will reduce the present twelve-minute schedules to one of ten minutes.

Transportation News Notes

Ten Cents on Another Line.—The Maine Public Utilities Commission has authorized the Fairfield & Shawmut Railway, Fairfield, to raise its fare from 7 cents to 10 cents. The commission has directed the company to permit school children riding to and from school to continue to pay the 7-cent fare.

Wants More in Walla Walla.—The Walla Walla Valley Railway, Walla Walla, Wash., has filed with the State Public Service Commission a new schedule of rates, under which it proposes to raise its fare from 5 cents to 10 cents, beginning Nov. 20. The company proposes to charge a 10-cent fare in each of the zones into which its line is divided.

No Decision on Albany Fares.—The Public Service Commission for the Second District has taken under advisement the petition of the United Traction Company, Albany, N. Y., for an increase in fare to 10 cents. At the final hearing before the commission, witnesses for the company testified that the total replacement valuation of its property was $18,646,195.

Ten Cents in New Albany.—Effective Nov. 1, the new fare charged by the Louisville & Northern Railway & Lighting Company and the Southern Indiana Traction Company, both of which operate between New Albany, Jeffersonville and Louisville, was raised to 10 cents. Protests against the increase were filed with the Interstate Commerce Commission. The new schedule will abolish the book-buying privilege.

War Veterans Pay Less.—Disabled war veterans taking vocational training in or near Seattle, Wash., will in the future be permitted to ride for a 3-cent cash fare on the lines of the Seattle Municipal Railway. The Seattle City Council recently voted to allow such men to ride at the same rates as those charged to school children. By buying tickets they may have two rides for 5 cents. There is no restriction as to hours during which the reduced fares will be in effect.

Six Cents in Each Zone.—The Massachusetts Department of Public Utilities has authorized the Berkshire Street Railway, Pittsfield, to raise its fare from 5 cents to 6 cents in each zone, except on its Lenox Branch where a 10-cent fare has been approved. C. Q. Richmond, general manager of the company, recently informed the commission that the railway must have an immediate increase in revenue if it was to continue operation. The new rates have already gone into effect.

Would End Skip-Stop.—An organization of citizens of Fort Worth, Tex., known as the non-partisan league, has started a campaign for the elimination of the skip-stop system on the local lines of the Northern Texas Traction Company. At a recent meeting the league passed resolutions calling upon the City Commission to take action looking to the improvement of the service furnished by the railway. The company recently raised its fare from 6 cents to 7 cents.

Mr. Jackson on Zone Fares.—Walter Jackson has an article on zone fares for electric railways in the *National Municipal Review* for 1920. He urges that the zone fare is not the dominant cause of congestion in cities, comparing cities with high population density where the unit fare prevails with cities of low population density where the zone fare is in use. In conclusion he says that the spirit of scientific research of merchandising service and of the relation of transportation to community welfare must be studied by the managements of today as it never was by their predecessors in the carefree period of electric railway development.

Needs More in Spokane.—The Washington Water Power Company, Spokane, Wash., will have to raise the fare on its Spokane city lines if it is to continue to furnish service of the present quality. Announcement to this effect was made by the officials of the railway in making public the cost of operating the system for October. The net revenue for the month totaled $2,188, a decrease of $3,865 compared to that for October a year ago. This was in spite of the fact that the number of passengers increased by 131,203. The company has been operating at a loss for several months. The fare is now 6 cents.

Disputes High Fare Claim.—In answer to the complaint of patrons on its Holliday line that the present fare from Salt Lake City to Holliday is excessive, the Utah Light & Traction Company, Salt Lake City, Utah, denies that the fare is unjust or excessive. The company points out that the round trip covers a distance of 19 miles for a charge of 37.5 cents, or at the rate of 2 cents a mile, which is lower than that exacted in other localities. The average length of ride on the system is about 2 miles, for which 3⅛ cents per mile is paid. The company further claims that the Holliday territory is sparsely settled, and that this rate does not bring an adequate return.

Service Cut Approved.—Judge Julius M. Mayer, in the United States District Court, has granted an injunction to Lindley M. Garrison, as receiver of the Brooklyn (N. Y.) Rapid Transit Company, prohibiting the Public Service Commission, First District, from taking steps to compel the restoration of service on various trolley lines in Brooklyn that have not been operated since the recent strike. The injunction, as served upon Commissioner Alfred M. Barrett, is similar to the one that was served some weeks ago upon his predecessor, Lewis Nixon. The last of the company's striking employees have voted to return to work.

Mayor Asks Aid for Railway.—A special committee has been appointed by Mayor Freeman of Springfield, Mo., in an attempt to solve the Springfield traffic problem arising out of the controversy between the Springfield Traction Company and the jitneys. Bus lines were established in Springfield during the carmen's strike three years ago. The public appears to have acquired the jitney habit to such an extent that although the traction company has obtained a 7-cent fare it is said to be losing between $4,000 and $5,000 monthly. Recently the jitney lines established a universal transfer system. Railway officials say that unless something is done to relieve the company of the jitney competition street railway service may have to be suspended.

More Cars for Holiday Crowds.—By placing all available rolling stock in use and by keeping the number of cars in the shops and carhouses at the very minimum for emergency needs, the Los Angeles (Cal.) Railway has been able to add eighty cars to handle the Christmas holiday season travel. The first additions to service were made early in November and in some cases will be maintained permanently. The railway, co-operating with merchants' organizations, appealed to the public through the newspapers advertising for early Christmas shopping. It was pointed out that street congestion in Los Angeles and the heavy influx of people together with the extra holiday travel made the need for even distribution of traffic more important than ever. Shoppers were urged to make purchases in the downtown section between the morning and late afternoon rush hours.

Service at Cost Favored.—The Indiana Service Corporation, Fort Wayne, Ind., which operates the city line in Fort Wayne and a number of interurban lines radiating from that city, is compiling reports on the first sixty days' operation under a 7-cent fare. During September half of the month was on the old basis of 5-cent fares and half on the new rate. The month showed a total revenue of $73,256 with operating expenses of $56,265. During the month of October 1,218,052 passengers were carried, while in the same month of last year the number of passengers carried was 1,201,537. The revenue for October of this year was $79,851. Officials of the company are fairly well satisfied with the results of the new fare, but are of the opinion that a better plan is the service-at-cost method. They are said to feel that there is a probability of its being adopted. The Indiana Public Service Commission granted the company permission to charge 7 cents for a period of sixty days. It is considered certain that upon the submission of reports by the company at the end of this period the commission will extend the time during which the company can operate on a 7-cent basis.

Personal Mention

George H. McFee Promoted

Arthur E. Stone, general manager of the Boston & Worcester Street Railway, Framingham, Mass., has resigned to take a responsible position with Gilmour, Rothery & Company, insurance brokers, of Boston and New York. Mr. Stone will continue to act in an advisory capacity for the railway and as treasurer of the Boston & Worcester Electric Companies.

George H. McFee, superintendent of transmission, has been appointed general superintendent of the Boston & Worcester.

F. C. Lewis has been made general freight and passenger agent. Mr. Lewis was formerly general freight agent of the railway.

L. J. Miller has been appointed chief engineer in charge of track, line and power. Mr. Miller was formerly roadmaster of the system.

Mr. McFee gained his early experience in the transportation field with a steam road. From 1894 to 1901 he served as telegraph operator and train dispatcher of the Boston & Maine. He then joined the Boston Elevated Railway as a tower-man on the elevated division. He became connected with the Boston & Worcester Street Railway shortly after the opening of that road in 1903. In 1913 he resigned to enter the employ of the United Fruit Company in Panama. Four years later he returned to the Boston & Worcester, assuming the position of superintendent of transportation. He is a Canadian by birth.

J. J. Kress, Superintendent

John J. Kress, formerly general manager of the Arkansas Southwestern Railway, has been appointed superintendent of the railway department of the Pine Bluff Company, Pine Bluff, Ark. Mr. Kress retired from steam railroading a number of years ago. Entering the banking business at that time, he helped to organize the Merchants & Planters Bank in Arkadelphia, Ark., and was for a number of years vice-president of that institution. He also served as Mayor of Arkadelphia for several years.

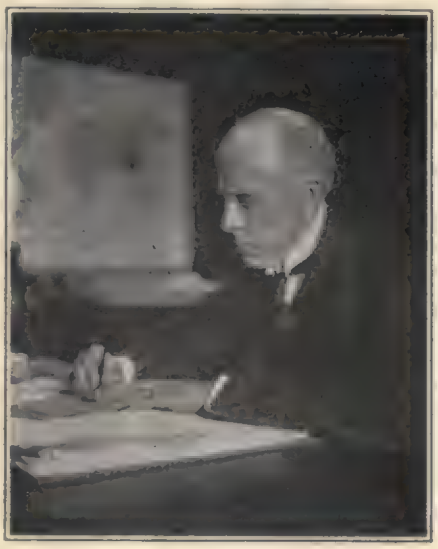
Mr. Kress was born on June 18, 1856, at Starkey, N. Y. He entered railway work in 1872 as an agent with the Pennsylvania Railroad. Six years later he was made assistant dispatcher of the same road, but resigned shortly thereafter to become superintendent of telegraph and chief dispatcher of the Ohio Southern Railway. From 1883 to 1886 he served as chief dispatcher and trainmaster of the Cleveland, Lorain & Wheeling Railway and the Pittsburgh & Western Railway.

In October, 1899, he became general superintendent of the Texarkana, Shreveport & Natchez Railway. He was appointed general manager of the Arkansas Southwestern Railway in 1901, resigning ten years ago to enter private business.

Lord Ashfield's Views

Chairman of London Underground Discusses Transportation Problems Before Institute of Transport

Among the numerous organizations that have been formed in Great Britain as a result of the war, focusing attention more directly upon the commercial and industrial problems of the day, is the Institute of Transport. This organization was established in 1919, "to promote and encourage knowledge of transport science in all its branches, and the means and appliances connected therewith; and to provide facilities for the study of and exchange of information and ideas on traffic problems and all means and methods of transport."



LORD ASHFIELD

The first president of the Institute was Sir Eric Geddes, the British Minister of Transport, who has been succeeded by Lord Ashfield, the chairman and managing director of the London Underground Railways and formerly, as A. H. Stanley, manager of the Public Service Railway of New Jersey. During the war Lord Ashfield occupied a post in the British cabinet as President of the Board of Trade.

The first meeting of the 1920-1921 session of the Institute was held in London on Oct. 18 last, when Lord Ashfield delivered a very instructive and comprehensive address upon the importance of transport in the welfare of mankind and on the need for promoting the higher education of the administrative staffs of transport undertakings. According to Lord Ashfield, transport has rendered practicable that specialization of function which is at the bottom of the success of the material progress of mankind. Thus, Greater London can support a population of more than 10,000 and Greater New York of more than 17,000 to the square mile, because the inhabitants can be fed by distant agricultural workers.

Transport, he said, was not a science so much as the practical application of many sciences to the solution of a special problem. There entered into it engineering in all its branches, economics in their most liberal extension, statistics and the imaginative treatment of figures, psychology in its modern social applications. Up to but recently only little attention had been given to studies leading up to a special understanding of transportation problems. This was the purpose of the Institute of Transport.

Part of its scheme, continued the speaker, was to provide for lectures, the holding of classes and examinations, the award of certificates, medals, scholarships and diplomas in connection with traffic and transportation. But education in this line was never finished. It was not once or twice that one needed the provocation of an altered post, a new position. It was throughout life, if one should seek to come out at the top and be a leader in transportation.

Frederick S. Pratt, superintendent of the Springfield (Vt.) Electric Railway, has been appointed auditor of the company. Mr. Pratt will continue to serve as superintendent.

E. S. French has been elected president of the Springfield (Vt.) Electric Railway. Mr. French succeeds Edward C. Crosby. The company is now in the hands of a receiver.

J. B. Moran has been elected president of the Escanaba (Mich.) Traction Company to succeed the late John J. Stack. Mr. Moran has been identified with the company for several years.

Edwin F. Zuehlke, superintendent and electrical engineer of the Escanaba (Mich.) Traction Company, has been appointed general manager of the company. Mr. Zuehlke succeeds P. L. Utley, deceased.

Frederick M. Abbott, who has been special investigator and safety inspector for the Public Utilities Commission of Utah for the past three years, has tendered his resignation. Mr. Abbott, in addition to his investigating work, has had charge of enforcing the commission's rulings with regard to general safety conditions. His work has attracted the favorable attention of the claims departments of some of the larger railroad lines and he has received several offers of positions with them. He has not yet announced his future plans.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Stocks of Poles, Crossarms, Etc., Good

Pole Buying Has Been Quite Heavy and Better Conditions Are Looked for This Winter in the Woods

Crossarm stocks have built up to the extent that plentiful supplies are on hand in local Mid-Western yards. Coast yards, it is reported, can make immediate shipment in any reasonable quantity. Certain jobbers are promising three weeks' delivery. There is not very much movement of crossarms around the Chicago territory, but in the neighborhood of St. Louis they are moving fairly well.

The season for pole buying is ending with a heavy demand in the Northern territory, which has been well taken care of. Stocks now, though, are very low. Farther south jobbers are having some difficulty getting the right kind of cars in which to ship poles, their stocks in yard are good and demand is falling off as the season advances. At the same time indications point to a good labor supply in the woods this winter and ample supplies at perhaps lower figures next year.

Base prices at mill of poles are quoted in St. Louis at from $11.35 on Western cedar 8-in., 40-ft. to $20 on the Northern white cedar 8-in., 40 ft. size. Locust pins are quoted there as follows: 1½ in. x 9 in. $60 per 1,000 in lots of 5,000, and the 1¼ in. x 8 in. pins $30 per 1,000. Large stocks are being reduced with difficulty.

Easier Market on Bolts, Nuts and Spikes

Slack Demand and Cancellations Have Reduced Back Orders—Tendency of Prices to Weaken

Since the market conditions reported a few months ago on track bolts, nuts and spikes, to the effect that demand was heavy and manufacturers far behind on filling orders, the market has taken a complete reversal of form. The steam railroads following their rate increases were especially heavy buyers of this class of material during the fall. Exceptionally mild weather and an easier supply of common labor were factors in the large amount of track material consumed.

At present, even though this is normally the dull season in this line, conditions have probably eased up more than ordinarily. Cancellations are reported numerous, especially in the bolt industry and from foreign consumers too. Demand, both domestic and foreign, has slumped badly, in the latter case largely due to a continuance of unfavorable exchange rates. Manufacturers of bolts, nuts and spikes are just now catching up with their back orders, however, and no surplus stocks have accumulated as yet.

Favorable conditions in the raw material and labor markets are leading to heavier production. Deliveries have greatly improved. Shipments of bolts, which last summer were ranging as long as six months, can now be obtained in one to two months on the standard sizes and spikes can be delivered in two to four weeks. Some softening of prices has occurred on bars, but on the finished product, while a slight shading of the level of independents is reported, there has been no decided change in price. A further price trend is largely dependent upon labor and raw material prices, in the case of spikes more directly upon the latter and with bolts more directly upon the labor costs. A representative independent's price at present on standard railroad spikes, 9/16 in. x 5½ in., is 4½ cents in car lots and 5¼ cents in smaller quantities. On track bolts the quotation is 6 cents in car lots and 7 cents in quantities less than that.

The outlook for 1921 business is held to be excellent because of the fact that both electric and steam lines have not yet entered the market nearly as heavily as their needs for track material would seem to require.

Big Demand for Rails Foreseen in 1921

Present Buying Curtailed by Price Uncertainties and Level of Foreign Exchange—Production Increasing and Deliveries Improved —Prices Not Yet Set

Domestic buying of steel rails, while not extra large at present, is said to be about average by several producers. Orders for 1921 are being placed, with price to be set later when the schedule for 1921 is announced, which is expected to be some time in December. Foreign demand, both from electric and steam railroads, is not up to standard.

A survey of the situation reveals the fact that inquiries from abroad are many, but actual orders placed are few. This indicates that the need for rails in foreign countries is strong, but adverse factors are holding up buying. Chief among these is the present foreign exchange situation, which makes it very expensive for consumers in other countries to buy in the United States. Furthermore, electric traction companies abroad are said to have suffered even more severely from depressing war conditions than those in this country, with a consequent curtailment of buying power.

These circumstances, it is hoped, will be improved next year. Certainly all present indications seem to point to one of the biggest buying years in the rail business for both foreign and domestic trade. In fact, it is pointed out that the known rail requirements of electric and steam roads in this country for 1921 are sufficient in all probability to curtail greatly the tonnage available for export shipment. Thus far the buying of steam railroads has not been up to expectations following their general rate increases three months ago.

A considerable number of unfilled orders for rails is reported on hand and in several cases there is quite a large tonnage awaiting shipment. Back orders are rapidly being reduced, however, and the recent order of the Interstate Commerce Commission releasing more gondola cars to general service is expected to aid considerably. Independent mills are still booked ahead with rail orders sufficient to carry them well beyond the first of the year. Production conditions have been steadily improving and as a result deliveries can be made in much better time than a few months ago. Chief among the factors bringing this about are decreased demand in many iron and steel lines, a better labor supply, with increased efficiency of workmen, due to the salutary effect of men being released, and less transportation difficulty in obtaining raw material. Considerable complaint is still heard of the fuel supply, however.

PRICE SCHEDULES UNCERTAIN

No rail prices, so far as can be learned, are definitely outlined for 1921, and this uncertainty is undoubtedly reflected in the buying market at present. A representative independent producer reports having accepted some orders for standard rails at $57 per ton and rumors are current of other quotations being made at $62, but these prices merely indicate the probable trend. The opinion is given from an authoritative source of information that the future level of independents' prices, when set, will not represent much change from the market level in the recent past.

The statement of Judge Elbert H. Gary, chairman of the board of the United States Steel Corporation, to the effect that base prices on products of the corporation will remain unchanged at this time unless changes become necessary to conform to altered conditions, has aroused considerable speculation as to whether this policy will be adhered to on rails. In several quarters is heard the view that the present corporation level of $45 per ton for standard bessemer and $47 for open hearth rails will be revised upward for 1921 to conform to increased costs of production. The present corporation prices on rails are the base selling prices mutually suggested by iron and steel interests with representatives of the United States government in March, 1919. The independent producers have gradually drifted further and further away from that level.

Linemen's Tools Becoming Available

Needed Labor and Raw Material Now Back in Market—Sixty to Ninety Day Delivery Anticipated

Jobbers and others who have been discouraged by their inability to get linemen's tools except on deliveries of from twelve to eighteen months will be able to get pliers in sixty to ninety days by January or February of next year, according to the estimate of one of the foremost manufacturers of this line. The war cut off the foreign supply of these tools, and the necessary skilled labor became so scarce that up to a few months ago the manufacturers of linemen's tools were getting further and further behind with their orders.

Pyramided orders have been canceled and all the needed labor and material have been obtained, so that the delivery not only on pliers but on connectors, climbers, etc., is being gradually reduced. This is especially true of climbers, which are intermittently obtainable from manufacturers' stocks.

Buying of Cattle Guards Curtailed by High Cost of Steel

Sales of cattle guards are not especially heavy at present. The volume of buying on the whole, it is stated, may still come up to the standard of other years, however. Ordinarily the installation of cattle guards by interurban lines is large at this time of year. Farmers take advantage of the additional grazing space afforded by the harvesting of crops and allow their cattle greater freedom in grazing, up to the time snow flies. Consequently, more protection is needed along rights-of-way. With the high cost of the special steel sheets from which guards are fabricated, however, both electric and steam roads have been holding off buying to some extent. Recently, it is true, steam roads have been buying cattle guards more briskly, possibly as a result of their improved financial condition, but this circumstance has not affected the supply materially. One manufacturer who specializes in Central and South American trade has been very successful in placing American products and reports good sales.

Some traction companies have adhered to wooden guards because of their lower cost, but these have been found less effective in operation. Even on the wooden product the price has been very high because of the great cost of lumber. In comparison with the number of steel guards placed in operation, the total of wooden guards used is said to be small. Raw material is apparently occasioning no trouble and manufacturers maintain a surplus supply sufficient to care for the needs of all customers. Deliveries are reported as satisfactory.

Buying of Electric Headlights Has Been Good

Better Deliveries Now With Improved Labor and Raw Material Conditions —Demand Slackening Recently

Manufacturers of electric car headlights report a very substantial increase in buying over last year on the part of electric railways, ranging as high as 100 per cent in some cases. The replacing of the old type metal reflectors on street cars and the large numbers of new safety cars that have been equipped with headlights are said to be strong factors in the demand. During the past few weeks, however, producers have been finding the market falling off, orders in some cases being as plentiful in number but much smaller in the quantity of headlights bought. Lamp manufacturers have felt the increase in new electric headlight installations this year, as evidenced by the increasing sales of incandescent lamps of this type reported by a leading producer.

Production conditions have gradually improved since midsummer, when transportation congestion and material shortages curtailed the supply of raw material with some manufacturers as much as 50 per cent and caused deliveries to range as long as eight to ten weeks. Labor troubles that were experienced, especially in the foundry field, now seem to be past, raw material in general is coming through nicely, and though deliveries vary all the way from almost stock shipment up to six or eight weeks' time, back orders are being steadily cut down.

Prices are steady, according to manufacturers, with no early reduction apparently contemplated. Recently, as a matter of fact, some talk was heard of a possible advance in quotations on the 1921 product, depending upon the trend of labor and material costs, which have been high. An encouraging view is taken of the prospects for future business in the electric headlight field, as it is hoped that current fare-rate increases will have their effect upon equipment buying, and that steam roads too will order substantially. In fact the electric headlight buying of steam railroads is said to have been far larger than usual of late.

Present Cost of Materials Compared With 1915

An interesting comparison of the cost of materials used by a public utility between July 1, 1915, July 1, 1918, and July 1, 1920, was brought out in a recent hearing before the Railroad Commission of Georgia. The accompanying table includes the costs of materials which were recognized by the commission as greatly increasing operating expenses over pre-war times.

COSTS OF COMMODITIES AND MATERIALS
F.O.B. ATLANTA

	1915	1918	1920
Coal, per ton	$2.56	$5.01	$11.80
Gas oil, per gal	0.046	0.091	0.14
Copper, per lb.	0.23½	0.27½	0.24½
Steel wire, per lb.	0.024	0.037	0.039
Standard poles, each, set	10.50	14.00	20.00
Crossarms and brackets	0.58	0.94	1.67
Yellow pine lumber, per 1,000 ft.	16.00	34.00	55.00
Insulators	0.95	2.24	2.80
Creosoted ties, each	0.69	1.07	2.02
Cement, per bbl.	1.25	2.18	4.50

Coal Shortage Still Serious Condition with Many Utilities

Despite a gradual improvement in the general coal situation many public utilities are in very bad condition. This is particularly true of those dependent on the gas-coal region served by the Louisville & Nashville Railroad and those using Monongahela gas coal. Utilities drawing their supplies of coal from the central Pennsylvania region are now getting better deliveries.

Rolling Stock

The Detroit (Mich.) Municipal Railway, mentioned in the Nov. 13 issue as placing an order for twenty-five safety cars, has let the contract for the cars at a cost of $6,745 each. General Electric motors and Westinghouse airbrake and safety equipment will be used.

The Northern Texas Traction Company, Fort Worth, Tex., has received the thirty-five safety cars recently ordered, and these have been placed in service. Purchase of these cars was one of the improvements in service promised by the company when it increased fares from 5 cents to 6 cents.

Recent Incorporations

Union Traction Company, Morgantown, W. Va.—The Union Traction Company has been chartered. The capital stock is $50,000. The incorporators are: James H. McGrew, Aaron J. Garlow, David H. Courtney, Frank Cox and George C. Baker, all of Morgantown. The charter authorized the company, in addition to maintaining an electric railway, to sell artificial gas, generate electricity and maintain water works in the city of Morgantown.

Track and Roadway

Detroit (Mich.) United Railway.—The Detroit United Railway has opened a new extension in the city of Pontiac known as the Sanford-Huron line.

Indianapolis (Ind.) Street Railway.—A comprehensive improvement plan for 1921 for the Indianapolis Street Railway has been outlined by the Board of Public Works which would require the expenditure of several million dollars. Several lines are to be rebuilt, among them the Shelby, Prospect and Virginia Avenue. In addition a new power plant and several substations are needed in various parts of the city. These would cost about $700,000.

Atlantic City & Shore Railroad, Atlantic City, N. J.—The City Commission has refused permission to the Atlantic City & Shore Railroad to build a loop at Boston and Atlantic Avenues, Atlantic City. The company has presented a petition to the commission asking permission to build a loop on Providence Avenue.

Northern Texas Traction Company, Fort Worth, Tex.—The Northern Texas Traction Company is constructing a single-track line on Commerce Street from Sixth to Weatherford. When this line is completed some of the cars now routed on Commerce Street will be rerouted via Weatherford, which will relieve the congestion of traffic on Commerce. George H. Clifford, general manager, reports material on hand to complete this line.

Dallas (Tex.) Railway.—The Standard Traction Company, which owns and operates a shuttle car line connecting with the line of the Dallas Railway, proposes to turn over the Mount Auburn line to the Dallas Railway. Last July the equipment of this line was offered to the Dallas Railway with a cash bonus for the construction of a new line to Mount Auburn, but the matter is still open. The Standard Traction Company, through its president, has announced that a considerable saving in the cost of electric power would be the result of the railway taking over the line.

Power Houses, Shops and Buildings

Northern Ohio Traction & Light Company, Akron, Ohio.—The Northern Ohio Traction & Light Company contemplates building an $18,000,000 to $20,000,000 power plant to supply the demand for industrial power in northern Ohio. Construction of the plant, however, is held up for the present because certain industries in Akron are undergoing important readjustments and until these are completed the Northern Ohio Traction & Light Company will not have signed up all the contracts necessary for the starting up of this construction. An option has been secured upon a site for the plant, which according to present plans will have an initial capacity of 120,000 kw. and will form part of a loop of power plants serving northern Ohio industries. The site of the plant is on the Muskingum River near Coshocton, Ohio, and was selected because of the proximity of coal and water supplies.

Trade Notes

The Black & Decker Manufacturing Company, Baltimore, Md., manufacturer of electric drills, etc., has awarded contract for the construction of a one-story machine shop, to cost about $50,000.

W. S. Quigley, president of the Quigley Furnace Specialties Company, New York City, has just returned from Europe after an extensive trip made in connection with large installations of the Quigley powdered-coal system in Italy and Belgium.

The Ohio Grease Company, Londonville, Ohio, announces that R. W. Beardsley has been elected treasurer. The capital stock has been increased from $250,000 to $500,000 and a large addition to the factory has been finished which will triple the capacity.

Belden Mfg. Company, Chicago, Ill., manufacturer of electrical wires, cable, etc., through the action of its stockholders has rescinded the increase in capital stock from $2,000,000 to $4,000,000 that was recently granted and has voted to increase the capitalization to $3,000,000.

The Economy Electric Devices Company, Chicago, Ill., has made a complete installation of watt-hour meters on the eighty cars of the Buffalo & Lake Erie Traction Company in Erie, Pa. These meters will be supplied with the special dials for inspecting equipment on the kilowatt-hour basis.

The Economy Fuse & Manufacturing Company, Chicago, Ill., announces that C. B. Merrell, who has been for a number of years in the general offices of the company, has been appointed district sales manager of the Philadelphia office, 523 Widener Building, vice E. J. Watson, resigned.

The Mason Regulator Company, Dorchester Center, Boston, Mass., has recently made a $150,000 addition to its pressure regulator factory, permitting the permanent housing of machinery which has been operated in wooden buildings during and since the war.

The Conveyors Corporation of America, Chicago, Ill., formerly the American Steam Conveyor Corporation, has appointed the J. B. Engineering Sales Company its Connecticut sales agent. The latter is also sales agent for the Terry Steam Turbine Company and the Griscom-Russell Company in Connecticut.

The Moloch Company, Kaukauna, Wis., recently incorporated with a capital stock of $750,000 to take over the plant and holdings of the Moloch Automatic Stoker Company, has awarded contracts for the first unit of its machine shop and erecting floor 60 ft. x 120 ft. Considerable new equipment will be installed.

Fairbanks, Morse & Company, Chicago, Ill., have purchased the entire business, consisting of all stock on hand, goodwill and liabilities, of the Luster Machine Shop & Railway Equipment Company, 917 Arch Street, Philadelphia. The Fairbanks-Morse company has opened a new branch at this address under the management of D. W. Dunn and will sell its complete line of engines, motors, pumps, etc. The entire personnel of the Luster Machinery Company has been retained by the new company.

E. T. Chapin Company, Spokane, Wash., announces the appointment of J. E. Slimp as manager of sales of the district including all of the United States and Canada east of the Dakotas and Winnipeg. Mr. Slimp's headquarters will be at 127 North Dearborn Street, Chicago. The Chapin Company is a large manufacturer of Western red cedar poles, piling and posts. Mr. Slimp has been selling supplies and equipment to power and electric railway companies for the last twenty years and is well known in the district to be covered by his office. He was connected with the Ohio Brass Company for a number of years.

Clifford F. Messinger has been appointed general sales manager of the Chain Belt Company, Milwaukee, to succeed L. C. Wilson, who has resigned to become secretary of the Federal Malleable Company. Other promotions announced are: C. E. Stone, assistant to the vice-president, and J. A. Monahan, purchasing agent. Mr. Messinger, for the last two years assistant to the vice-president, is a graduate of Yale and has been connected with the Chain Belt Company since 1911. Recently he was elected chairman of a group of nationally known construction machinery manufacturers associated for the purpose of developing export business.

New Advertising Literature

Commutation.—Bulletin No. 516 on "Commutator Troubles and Their Elimination," has just been issued by the Baylis Company, Bloomfield, N. J.

Gas Engines.—The C. & G. Cooper Company, Mount Vernon, Ohio, has issued a forty-page bulletin on its horizontal double-acting, four-cycle, single and twin tandem types of gas engines.

Oil Engines.—The De La Vergne Machine Company, foot of East 138th Street, New York City, has recently issued bulletins Nos. 176, 177-5, M-5-19, 178 and 153-No. 40, describing and illustrating its different types of oil engines for power plants, etc.

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WE BUILD TRACKS

Construction—Maintenance—Rehabilitation

ENGEL & HEVENOR

Track Engineers—Contractors

220 Broadway, New York City

AMERICAN BRIDGE COMPANY
HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

Manufacturers of Steel Structures of all classes particularly BRIDGES AND BUILDINGS

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A Man Who is Now in Maine *may be* The Man You Need in Texas

The man for the job—wherever he may be—can be located through the

SEARCHLIGHT SECTION

"SEARCHLIGHT" ads locate experienced men for responsible positions everywhere. They give a wide choice of candidates.

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"*Think* SEARCHLIGHT *First*"

0134

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
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PHILADELPHIA, PA.
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ELECTRIC RAILWAYS

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Square crosses constructed by Thermit Welding for the Omaha & Council Bluffs Street Railway, Omaha, Neb.

Shop-Built Thermit Welded Special Work Keeps Track Labor Busy in Winter

If you lay off your experienced track men during the dull winter months you pay the heavy penalty of having to break in untrained forces when maintenance and construction work is resumed in the Spring.

If you don't discharge your track men you risk the penalty of having a labor surplus on your pay rolls

UNLESS

You equip your shop with one of our inexpensive Thermit Welding outfits with which long-lived Frogs and Crossings can be constructed at a great saving in cost as compared with manganese special work.

Let us send you at once one of our experienced engineers to instruct your men free of charge and start them off in this work.

Send for our new Pamphlet No. 39, just issued, which describes for the first time certain previously unexplained advantages of Thermit Welded Special work, which will not fail to appeal to you.

Metal & Thermit Corporation

120 Broadway New York

Pittsburgh Chicago Boston San Francisco Toronto

Butt-Treated
BY
PAGE & HILL Co
1920
GUARANTEED
One-Half Inch
PENETRATION

This Disc and Guarantee

Solves Your Pole Problems

They Are Your Guarantee of One-half Inch Uniform Penetration—

NEVER before in the cedar pole industry has such a guarantee been made. Every buyer of transmission poles knows what this guaranteed uniform penetration means in added years of life to the poles so Butt-Treated.

The initial cost of this process is but little more than that of the old methods, but in the long run is far cheaper. It cuts pole maintenance costs to an absolute minimum.

Behind this guarantee stands the reputation of Page & Hill Co., foremost in the Butt-Treatment of poles.

There is no other Butt-Treating process that guarantees the penetration result but this. Insist upon the P & H Guaranteed Penetration Process.

Full Particulars Upon Request.

PAGE & HILL CO.
Minneapolis, Minn.

BRANCH OFFICES:
Times Bldg., NEW YORK, N. Y.
717 Bryant Bldg., KANSAS CITY, MO.
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1111 Carter Bldg., HOUSTON, TEXAS
311 Sumpter Bldg., DALLAS, TEXAS
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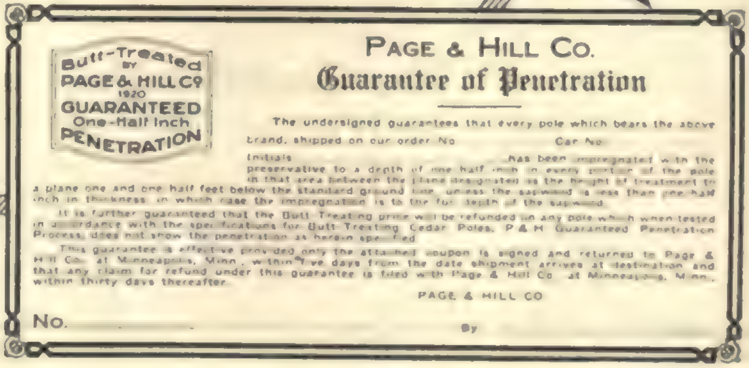
Originators of the P & H Guaranteed Penetration Process. Producers, manufacturers, and foremost in the Butt-Treatment of poles.



Butt-Treated
BY
PAGE & HILL Co
1920
GUARANTEED
One-Half Inch
PENETRATION

PAGE & HILL CO.
Guarantee of Penetration

The undersigned guarantees that every pole which bears the above brand, shipped on our order No. Car No. Initials has been impregnated with the preservative to a depth of one half inch in every portion of the pole in that area between the plane designated as the height of treatment to a plane one and one half feet below the standard ground line, unless the sapwood is less than one half inch in thickness, in which case the impregnation is to the full depth of the sapwood.

It is further guaranteed that the Butt Treating price will be refunded on any pole which when tested in accordance with the specifications for Butt Treating Cedar Poles, P & H Guaranteed Penetration Process, does not show the penetration as herein specified.

This guarantee is effective provided only the attached coupon is signed and returned to Page & Hill Co. at Minneapolis, Minn., within five days from the date shipment arrives at destination and that any claim for refund under this guarantee is filed with Page & Hill Co. at Minneapolis, Minn., within thirty days thereafter.

PAGE & HILL CO

No.

By

No Human Element in This Case

The life of this little tot was not dependent on the motorman operating anything to drop the guard. Why? Because H-B Life Guards are automatic and positive in operation. The instant the gate in front is touched, down goes the life guard, picking up and carrying the person safely until the car is stopped. They are the best prevention for front end accidents.

The little tot is safe because the car was H-B life-guarded. Your railway is safe only when all of your cars are protected with H-B life guards. Specify them on your new equipment and install them in your old—freedom from death claims is the premium they pay.

H-B Life Guards, the last word in making the safety car safer.

The Consolidated Car Fender Co.
Providence, R. I.

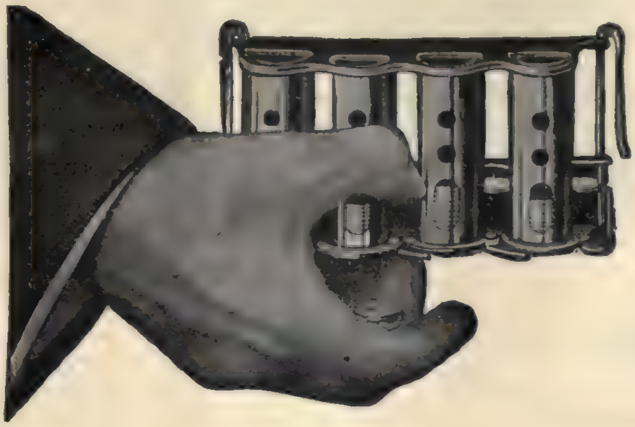
General Sales Agent

Wendell & MacDuffie Co.
61 Broadway, N. Y.

High Speed

Money Changers

should be included in your standard equipment



Time cannot be bought so why not save as much as possible. You can eliminate many of the unnecessary delays—supply your conductors with HIGH SPEED MONEY CHANGERS which are indispensable when once in use.

The rapid and accurate handling of change is to your advantage where there is a congestion of heavy traffic.

Complete descriptive circulars and price lists of the many combinations produced are at your disposal upon request.

J. L. GALEF

Manufacturers' Selling Agent

75 Chambers Street, New York City

—how individual lubricating service reduces lubricating costs . . . . .

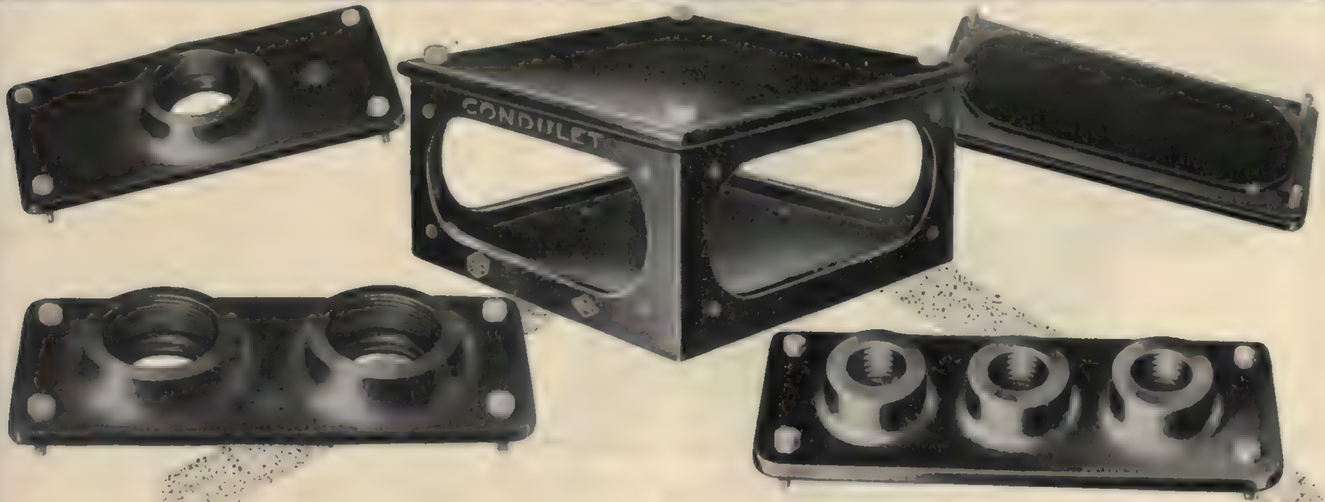
STOP	Consider a lubricant which does show a saving in the upkeep of motor maintenance.
LOOK	Put a test of **TULC** under your own cars—let it run. We will help.
LISTEN	We are willing to put the test on—and listen for your decision.

Why Not Make a Test Now

The Universal Lubricating Co.
Cleveland, Ohio
Factory: Sweeney Ave. **Office: Schofield Bldg.**

TULC—Universal Service

CONDULETS



Accessible Junctions

HERE is a Condulet which will meet the requirements of almost any conduit junction. It is greatly superior to the ordinary type of junction box, which is sometimes resorted to.

It consists of a cast iron body with a cast iron cover and a series of side plates. By proper selection of side plates, the Condulet meets both the usual and the unusual conditions.

The cover and side plates are gasketted, thus making the Condulet water-tight.

CROUSE-HINDS COMPANY

SYRACUSE, N. Y.

BOSTON NEW YORK CHICAGO

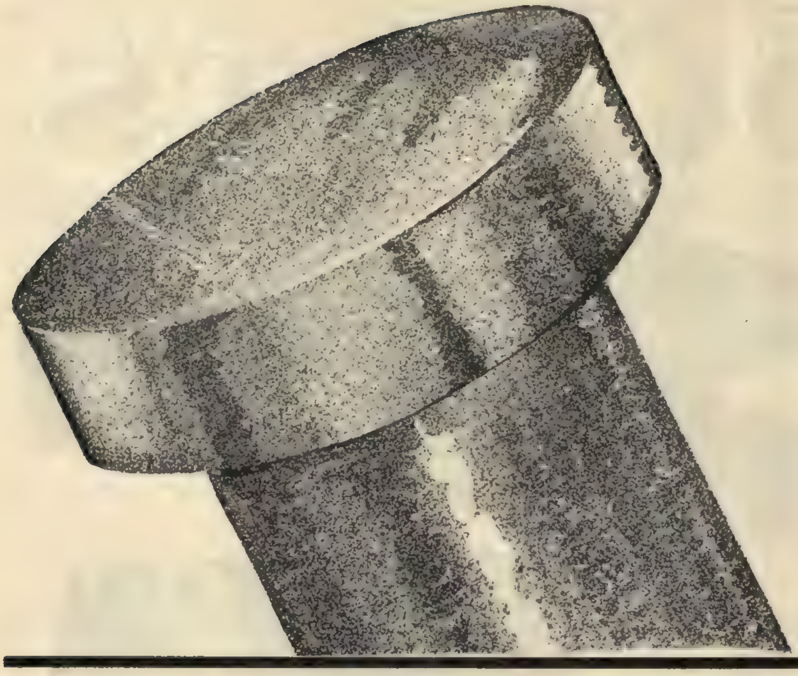
Condulets Panelboards
Knife Switches Floodlights
Guy Anchors

1585

Condulet the Job

RS CONDULET
29 different styles of side plates are available.

CROUSE-HINDS



Analyze These, Please, on Your System, Then

BOYERIZE Your Brake Rigging

1—Collisions of cars
2—Collisions of cars with persons
3—Collisions of cars with animals
4—Collisions of cars with vehicles
5—Cars derailed
6—Lost control of car

No. 1 implies damage to your property and injury to your customers.

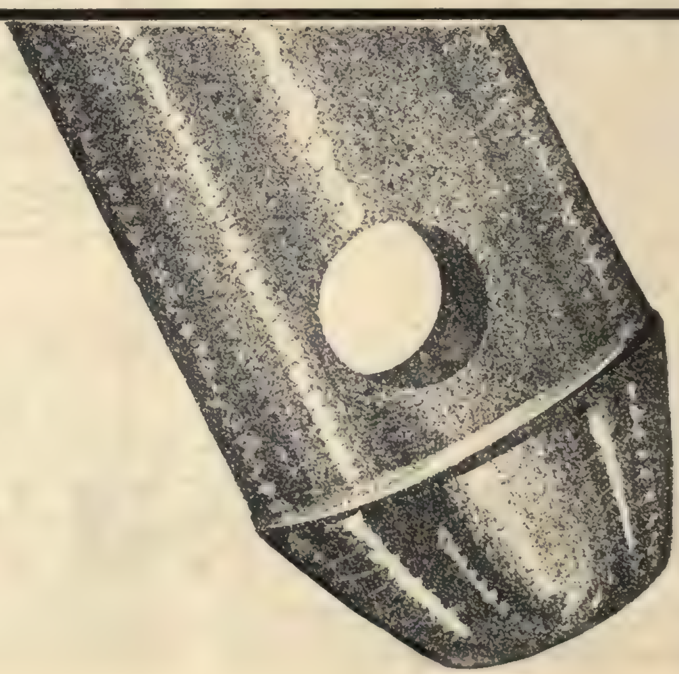
No. 2 implies injury to pedestrians, many of whom ought to be attracted to become your customers.

No. 3 implies injury to animals. They're growing scarcer, but their owners rate 'em at a high price when they're hurt.

No. 4 implies damage to anything from a Ford to a Rolls-Royce. Surprising, isn't it, that a bumped auto was either new or almost new and that you're asked to settle accordingly?

Nos. 5 and 6 imply that 'most anything could happen when the car doesn't stop where the motorman thought it would.

To make your cars stop before they can cause accident calls not only for good brakes but absolutely dependable brake rigging. Boyerized pins and bushings will make your brake rigging dependable for many, many more miles than to-day.



To Boyerize means:

Boyerized Brake Lever Pins and Bushings

Boyerized Brake Hangers

Boyerized Wearing Plates between the Bolster and Bolster Carrier

Boyerized Wearing Plates between the Pedestal Straps and the Journal Box

Bemis Car Truck Company

Electric Railway Supplies

Springfield, Mass.

Purohit

Every Hindu household contains an idol corresponding to the value of the family's wealth. At stated intervals the village Purohit, or priest, visits and worships it—carrying home with him the offerings of rice, fruits, sweetmeats, etc.

Needless to say, he arrives home in a very self-satisfied state, so much so in fact that one wonders whether his mind was on the idol or on the sweetmeats.

In much the same way operators are beginning to wonder whether the vendor of cheap carbon brushes has his eye on satisfactory machine operations or on the jack he can get away with—on which he comes in for a little divvy on the side.

To preclude just such practice as this, Morganite prescribers are paid an annual stipend based on the amount of satisfaction they sow in the field.

You reap what they sow.

Morganite
Brush Co., Inc.

Main Office and Factory: 519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Lewis & Roth, 13th and Wood Sts., Philadelphia

Electrical Engineering & Mfg. Co.
First National Bank Bldg., Pittsburgh

R. W. Lillie Corporation
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W. R. Hendrey Co., Hoge Bldg., Seattle

Herzog Electric & Engineering Co., 150 Steuart St.
San Francisco

Charles Farnham, I. W. Hellman Bldg.
Los Angeles

Railway & Power Engineering Corporation, Ltd.
131 Eastern Ave., Toronto, Ontario, Canada

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

"The 'Standard' Brand on your material is an assurance of eventual economy."

STANDARD STEEL WORKS CO.

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CHICAGO
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HAVANA, CUBA
ST. PAUL

RICHMOND
SAN FRANCISCO
NEW YORK
HOUSTON

MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

The Reasons Why

Rolled and Forged Circular Sections

made by our special methods should be specified

Told in Five Chapters

CHAPTER V

The Finished Product

The hydraulic forging and rolling operation practically completes the piece that is being made. Only a few minor operations remain such as punching the hub, if specified, drilling the web, rough machining, etc.

Among the many advantages of making circular sections by this method are the following:—

(1) Steel has been thoroughly worked at proper temperature.
(2) Absolutely sound and homegeneous metal insured.
(3) Outer surface, where greatest strength is needed, receives the most working.
(4) Are superior to iron or steel castings and ordinary forgings.

Uniform Circular Sections

of many kinds can be made by our special methods. A few of these are listed below:

Automobile Flywheel Blanks
Car Wheels
Crane Track Wheels
Gear Blanks
Industrial Wheels
Shaft Coupling Blanks
Turbine Discs

TURBINE BUCKET WHEEL

ROUGH TURNED GEAR BLANK

STREET CAR WHEEL

AUTOMOBILE FLYWHEEL BLANK

SHAFT COUPLING

Write for detailed information.
Also watch for next week's advertisement.

Midvale Steel and Ordnance Company
Cambria Steel Company

General Sales Office, Widener Building, Philadelphia, Pa.

District Sales Offices
Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia
Pittsburgh, San Francisco, Salt Lake City, Seattle, St. Louis

Sole Export Representatives
Consolidated Steel Corporation, 165 Broadway, New York
All export inquiries should be sent to this address

40-1

Poles

for Trolley Supports

Massey hollow reinforced concrete trolley supports made by our centrifugal process are strong, permanent, neat and adaptable.

Eliminate maintenance by ordering poles that represent the most progressive development in this field. Massey poles never need painting or repairing—and are unaffected by weather conditions or vermin.

Facts and figures gladly furnished.

MASSEY CONCRETE PRODUCTS CORPORATION Peoples Gas Building
CHICAGO, ILLINOIS

New York
50 Church Street

Pittsburgh
Oliver Building

Atlanta
Candler Building

Dallas
Sumpter Building

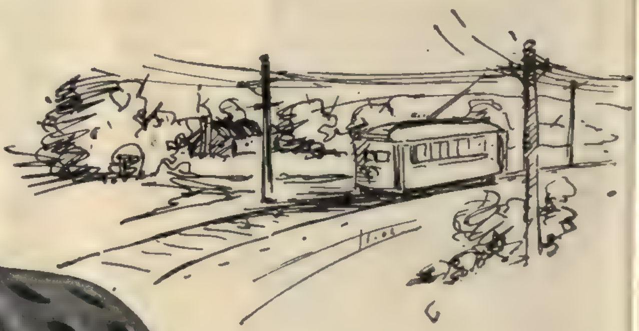
St. Louis
Railway Exchange Building

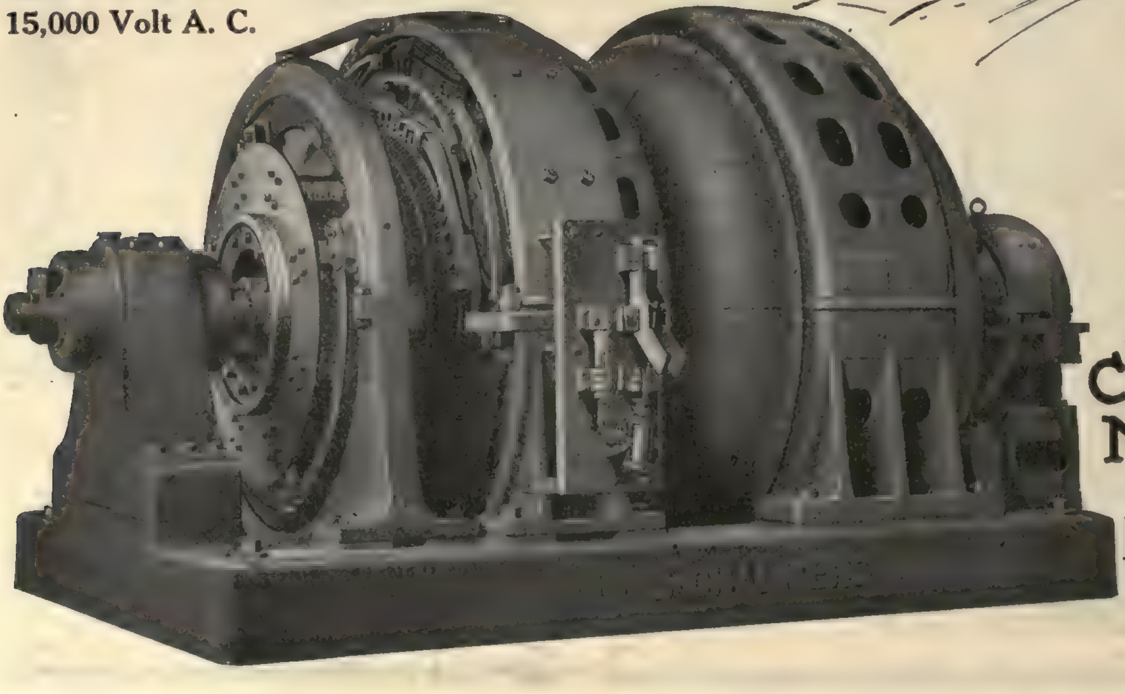
Salt Lake City
925 So. 6th Street, West

ALLIS CHALMERS

Railway Sets-

1000 K.W., 600 R.P.M.
1200 Volt D. C.
15,000 Volt A. C.





Allis-Chalmers Mfg Co.

Milwaukee, Wisconsin.

THERE ARE THREE VALUES FOR RAILWAY COMPANIES IN THE SPECIFICATION and USE OF

CYPRESS

"THE WOOD ETERNAL"

for Crossarms, Car Material, Fencing, Station Construction and similar railway purposes:

First, the vastly longer life of the material itself. *All-Heart Cypress* is pretty nearly *proof* against the action of decay.

Second, the

SAVINGS OF LABOR COSTS IN YOUR MAINTENANCE WORK.

Obviously the longer the serviceable life of the lumber you use, the less you are going to have to repair and replace. That of course means not merely saving in cost of material, but also saving in the much bigger item—*cost of labor*.

Third, when you specify Cypress you can know *definitely* that you get what you pay for IF you see THIS MARK: This mark is on the ends of every piece of Cypress cut by the responsible mills in this Association. It is a guarantee that the material bearing it is made, *and graded at the mill*, in accordance with the scrupulously high standards demanded by this Association and the best customers of its members.

These *values* are worth *getting*. The *facts* are worth *remembering*.

Our data is at your service.

SOUTHERN CYPRESS MFRS.' ASS'N.

1265 Perdido Building, New Orleans, La., or
1265 Heard National Bank Building, Jacksonville, Fla.

Bates One-Piece Steel Poles in Lapland, Sweden

These Expanded Steel Poles are being used by the Royal Swedish State Railways to give permanent construction in Lapland, Sweden—75 miles north of the arctic circle. Climatic conditions are extremely severe in this wind swept arctic solitude. Patroling this line is impossible at times, replacements are prohibitive—the construction just had to be permanent and reliable as well as economical, so Bates Poles were chosen.

The engineers of the Swedish government who made this installation have recommended and specified Bates Poles many times since then and we ship them thousands of poles yearly. This installation demonstrated beyond any doubt that Bates one-piece Steel Poles are dependable, permanent and decidedly economical.

Your construction is permanent when you use Bates one-piece steel poles. Their economical tested strength gives unfailing service.

Our New 1921 TREATISE AND HANDBOOK sent upon request.

Bates Expanded Steel Truss Co.

208 South La Salle Street
CHICAGO, ILLINOIS

NOARK
RENEWABLE FUSES

What the straight edge shows

LAY a straight edge alongside any ferrule contact "Noark" Renewable Fuse. See how even both parts of the ferrule are?

That is why there is perfect contact between ferrule and cutout clip.

Just one of the many details, which added together in the "Noark" Renewable Fuse, have given it a reputation for reliable accuracy.

Send for the booklet.

The entire line of Noark Renewable Fuses, as well as all Noark N. E. C. S. Non-Renewable Fuses is approved by the Underwriters' Laboratories, Inc.

Manufactured by the Johns-Pratt Co., Hartford, Conn.; Johns-Manville Inc., sole selling agents.

JOHNS-MANVILLE
Incorporated
Madison Avenue at 41st Street
New York City
10 Factories—Branches in 64 Large Cities
For Canada:
CANADIAN JOHNS-MANVILLE CO., Ltd.
Toronto

Johns Manville Service
Covers the Continent
Through—
Asbestos
and its allied products
JOHNS-MANVILLE
Serves in Conservation
Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products

JOHNS-MANVILLE
ELECTRICAL MATERIALS

N. Y.

18,208 Elec Ry Cars in N.Y. State of which

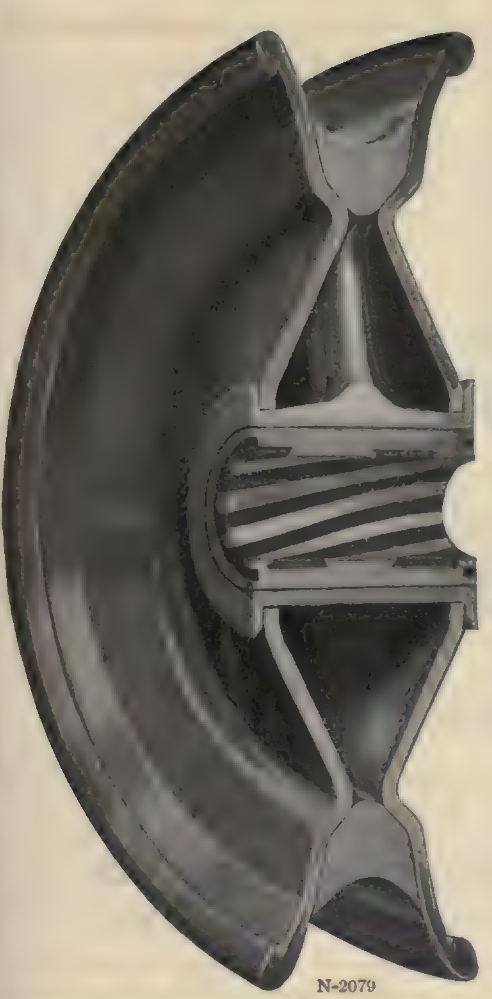
11.958 are controlled by Co's.

which regularly use

"Tool Steel" gears + pinions

$\frac{11958}{18208}$ = 65 %

Watch for your state!



Nuttall

The IDEAL Wheel has a Clear Path for the Current

The illustration shows clearly the integral cast construction of the contact ring with the hub thus insuring an unobstructed path for the current. The material used in this part is bronze which has a low current resistance, but a high, natural resistance to wear.

Drop forging further increases this part's inherent resistance to wear.

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

"Had 5 answers to the first issue"

So the Selma Electric Railway Co., Selma, Ala., wrote us in regard to their recent ad. in the

SEARCHLIGHT SECTION
of
Electric Railway Journal

"SEARCHLIGHT" ads are Opportunity ads. They are watched carefully each week by the whole electric railway field.

"SEARCHLIGHT" ads cost little and invariably bring prompt returns.

For Every Business Want
"Think SEARCHLIGHT First"

0133

Aluminum Company of America
General Sales Office
2400 Oliver Bldg., Pittsburgh, Pa.

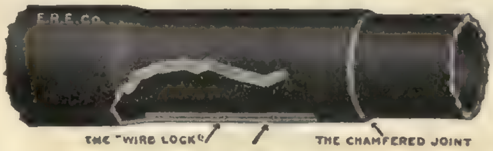
PRODUCERS *of* ALUMINUM
Manufacturers of
ELECTRICAL CONDUCTORS
for
Industrial, Railway and Commercial Power Distribution
also
Ingot, Sheet, Tubing, Rod, Rivets, Moulding, Extruded Shapes, Bronze Powder and Foil
also
Litot Aluminum Solders and Flux

CANADA
Northern Aluminum Co., Ltd., Toronto
ENGLAND
Northern Aluminium Co., Ltd., London
LATIN AMERICA
Aluminum Co. of South America, Pittsburgh, Pa.

DOES necessity, that is the need of better protection against collision and more accurate schedules, compel you to say to your Directors

Chapman
Automatic Signals
Charles N. Wood Co., Boston

ELRECO TUBULAR POLES



COMBINE
Lowest Cost **Lightest Weight**
Least Maintenance **Greatest Adaptability**
Catalog complete with engineering data sent on request.
ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
(Single, Duplex and Three Phase)
TROLLEY WIRE
(Round, Grooved or Figure 8)
BARE COPPER WIRES AND CABLES
MAGNET WIRE
(Cotton or Asbestos)
Americanite Rubber Covered Wire
Incandescent Lamp Cord
Galvanized Iron and Steel Wire and Strand
AMERICAN ELECTRICAL WORKS
Phillipsdale, R. I.
Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way; San Francisco, 612 Howard; Seattle, 100 1st Ave. So.

Trolley Wire
INSULATED WIRES AND CABLES
WELDING WIRE WIRE STRAND
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

COPPER CLAD STEEL COMPANY
OFFICE AND WORKS:
RANKIN, PA. BRADDOCK P. O.
WESTERN SALES REPRESENTATIVES:
STEEL SALES CORPORATION, CHICAGO, ILL.
NEW YORK SALES OFFICE: 30 CHURCH STREET, NEW YORK CITY
"Copperweld"—a copper conductor with the strength of steel. Cheaper, stronger, better than copper wire.

LUMBER
Specialists in Street Railway Requirements
Write for List
TIES—TIMBERS—POLES—PILING
DUNCAN LUMBER COMPANY, Portland, Oregon

SPECIAL
TRACK WORK

For Electric and Steam Railroads, in all types of construction
Converter and Electric Steel Castings
Hammer and Press Forgings
Seamless Steel Gas Cylinders

WM. WHARTON
JR. & CO. INCORP.

EASTON, PA.
Subsidiary of Taylor Wharton Iron & Steel Co.
High Bridge, N. J.

OTHER PLANTS:
Philadelphia Roll & Machine Co., Philadelphia.
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ORIGINATORS OF
MANGANESE STEEL
TRACK WORK

American
Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDERED
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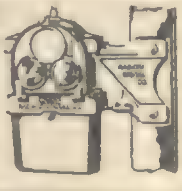
Send for new
Rail Bond book

American Steel & Wire
Company
CHICAGO
NEW YORK

AUTOMATIC SIGNALS
for Electric Railways
Highway Crossing Bells
Headway Recorders
NACHOD SIGNAL COMPANY, Inc.
LOUISVILLE, KY.



BARBOUR-STOCKWELL CO.
205 Broadway Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Bailwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

EUREKA PRODUCTS
Commutators, Trolley Wheels, Sleet Trolley Wheels, Trolley Ears, Line Material, Controller Fingers, Brush Holders, etc.

We make quality goods.

THE EUREKA COMPANY, North East, Pa.

U. S. Electric Contact Signals
for
Single-track block-signal protection
Double-track spacing and clearance signals
Protection at intersections with wyes
Proceed signals in street reconstruction work
United States Electric Signal Co.
West Newton, Mass.

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG.

ARCHBOLD-BRADY CO.
Engineers & Contractors **SYRACUSE, N. Y.**

LACKAWANNA AIDS TO BETTER TRACK
See our double page advertisement in last week's and next week's issues and send for booklets "Lackawanna Deseamed Rails," "Improved Track Appliances" and "Track Bolts and Spikes."

Lackawanna Steel Company

Sole Exporter of Our Commercial Products, Consolidated Steel Corp., New York
General Sales Office and Works: Lackawanna, N. Y.
Boston Chicago Cleveland New York St. Louis
Atlanta Buffalo Cincinnati Detroit Philadelphia San Francisco

AETNA INSULATION LINE MATERIAL
Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches.

lbert & J. M. Anderson Mfg. Co.
289-93 A Street, Boston, Mass.
Established 1877
Branches—New York, 135 B'way, Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
London, 48 Milton Street

I-T-E

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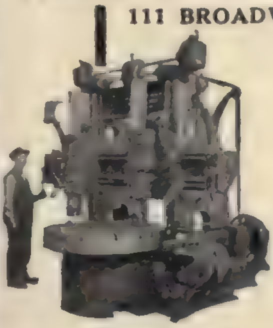

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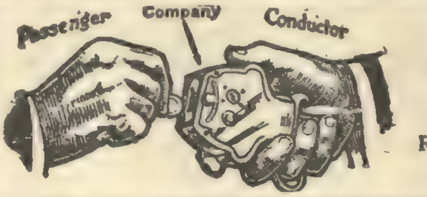

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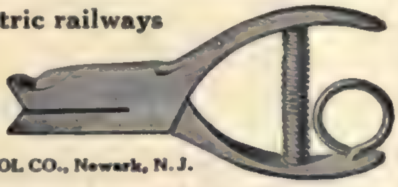

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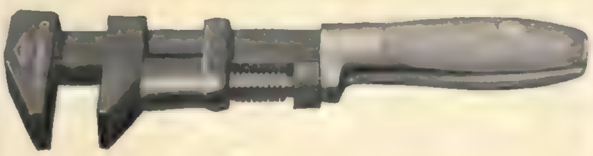

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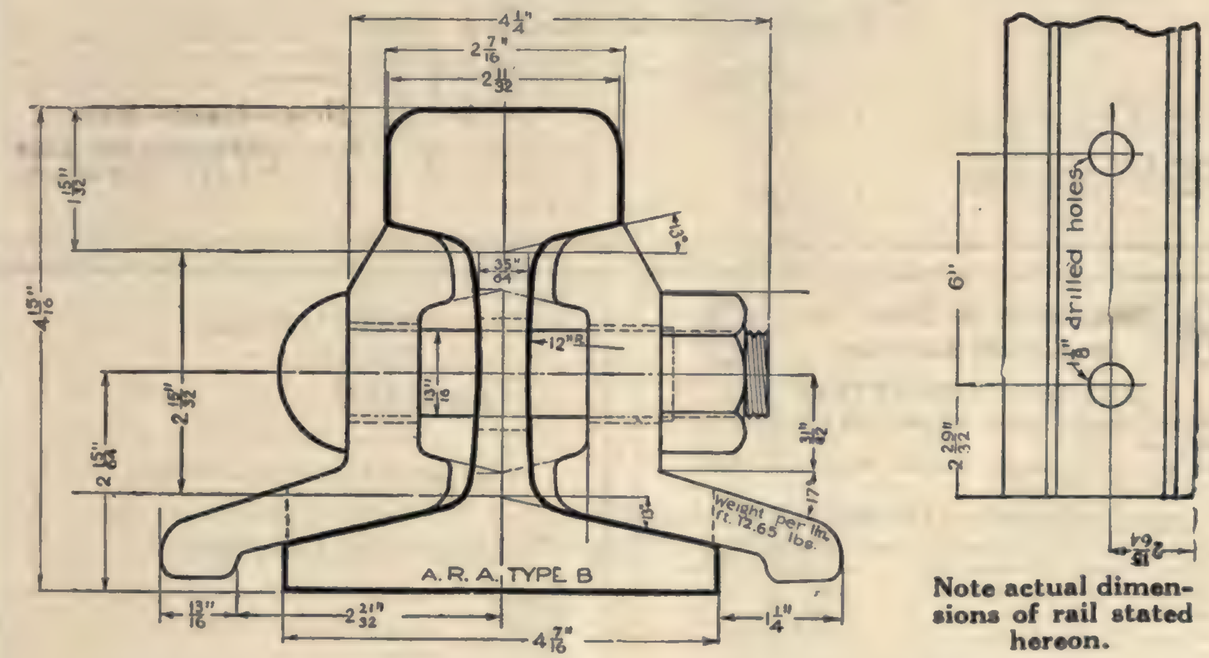

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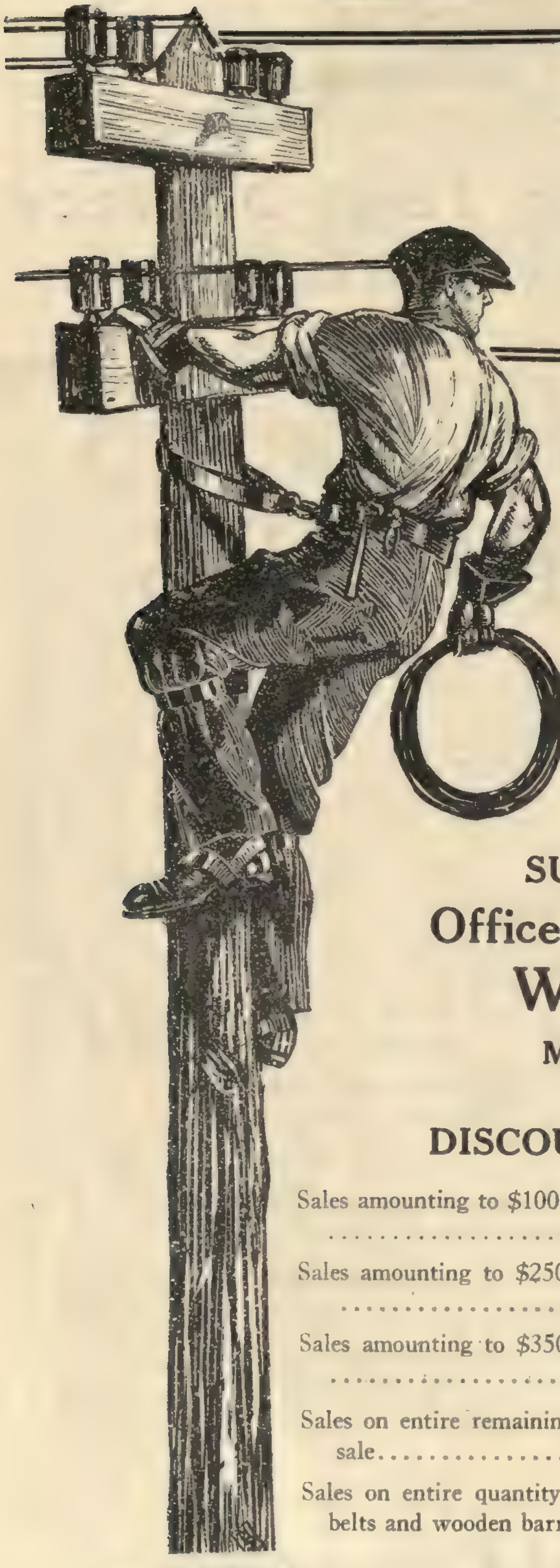

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Lineman's Tool Belts

Quantity 2144. Type, W. rings and safety straps. Mfgd. by Mathais Kline & Company, Chicago, Ill. Fixed price $5.60 each. Located at Philadelphia, Pa. Order through New York City. S.P.D. No. 3465.

Lineman's Tool Belts

Quantity 400. Type, W. rings and safety straps. S.C.G.S.D. Mfgr. Buckman Mfg. Co., New York City. Fixed price $5.60 each. Located at Ft. Wood, New York Harbor. Order through New York City. S.P.D. No. 1010.

Knobs, Porcelain

Quantity 500. Type, split 2 line. Fixed price .048 each. Located at Philadelphia, Pa. Order through New York City.

Supporters

Quantity 950. Type, messenger clamp. Fixed price .12 each. Located at Ft. Wood, New York Harbor. Order through New York City. S.P.D. No. 1206.

Bridges

Quantity 13. Type, Wheatstone W.E., No. 1407. Fixed price $80.00 each. Located at Chicago, Ill. Order through Chicago, Ill. S.P.D. 3069.

Repeating Coils

Quantity 4. Type, repeating W.E. 27-F. Fixed price $3.50 each. Located at Philadelphia, Pa. Order through New York City. S.P.D. No. 3006.

Retarding Coils

Quantity 4. Type, retarding W.E. 57-A. Fixed price $8.00 each. Located at Philadelphia, Pa. Order through New York City. S.P.D. No. 3007.

Reels

Quantity 2000. Type, wood, reinforced and braced with metal braces. Fixed price $4.00 each. Located at Philadelphia, Pa. Order through New York City. S.P.D. No. 3504. These reels were manufactured by M. Kline & Co., Chicago, Ill.

Reels

Quantity 110. Type, wood, Barrow (payout). Fixed price $5.60 each. Located at Ft. Sam Houston, Texas. Order through San Antonio, Texas. S.P.D. No. 968. These reels were manufactured by M. Kline & Co., Chicago, Ill.

Reels

Quantity 1599. Type wood Barrow (payout). Fixed price $5.60 each. Located at Chicago, Ill. Order through Chicago, Ill. S.P.D. No. 969. These reels were manufactured by M. Kline & Co., Chicago, Ill.

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Fort Mason

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
- Collier, Inc., Barron G.

Air Aftercoolers
- Ingersoll-Rand Co.

Air Receivers
- Ingersoll-Rand Co.

Ammeters
- Weston Electrical Instrument Co.

Anchors, Guy
- Electric Service Supplies Co.
- Johns-Manville Co., H. W.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Angle Bars
- Lackawanna Steel Co.

Ash Storage Tanks, Cast Iron
- Green Engineering Company

Automobiles and Buses
- Brill Co., The J. G.

Axles
- Bemis Car Truck Co.
- Cambria Steel Co.
- St. Louis Car Co.

Axle Straighteners
- Columbia M. W. & M. I. Co.

Axles, Car Wheel
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Standard Steel Works Co.
- Westinghouse Elec. & Mfg. Co.

Babbitt Metal
- Ajax Metal Co.
- More-Jones Brass & Metal Co.

Babbitting Devices
- Columbia M. W. & M. I. Co.

Badges and Buttons
- Electric Service Supplies Co.
- International Register Co., The

Batteries, Dry
- Johns-Manville Co., H. W.
- National Carbon Co., Inc.

Batteries, Storage
- Electric Storage Battery Co.
- National Carbon Co., Inc.

Bearings and Bearing Metals
- Ajax Metal Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- More-Jones Brass & Metal Co.
- St. Louis Car Co.
- Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
- Stucki Co., A.

Bells and Gongs
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- St. Louis Car Co.

Benders, Rail
- Niles-Bement-Pond Co.

Boilers
- Babcock & Wilcox Co.

Bond Testers
- American Steel & Wire Co.

Bonding Apparatus
- American Steel & Wire Co.
- Electric Railway Improvement Co.
- Electric Service Supplies Co.
- Ohio Brass Co.

Bonds, Rail
- American Steel & Wire Co.
- Copper Clad Steel Co.
- Electric Railway Improvement Co.
- Electric Service Supplies Co.
- General Electric Co.
- Johns-Manville Co., H. W.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
- Niles-Bement-Pond Co.

Boxes, Junction and Outlet
- National Metal Molding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
- American Bridge Co.
- Bates Expanded Steel Truss Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- Hubbard & Co.
- Ohio Brass Co.

Brake Adjusters
- National Ry. Appliance Co.
- Westinghouse Traction Brake Co.

Brake Shoes
- Amer. Brake Shoe & Fdry. Co.
- Barbour-Stockwell Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
- Ackley Brake & Supply Corp.
- Allis-Chalmers Mfg. Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- National Brake Co.
- Safety Car Devices Co.
- St. Louis Car Co.
- Westinghouse Traction Brake Co.

Bricks, Fire
- Green Engineering Co.

Bridges and Buildings
- American Bridge Co.

Brooms, Track, Steel or Rattan
- Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
- Corliss Carbon Co.
- General Electric Co.
- Jeandron, W. J.
- Morganite Brush Co., Inc.
- National Carbon Co., Inc.
- United States Graphite Co.
- Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
- United States Graphite Co.

Brush Holders
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Eureka Co.

Bunkers, Coal
- American Bridge Co.

Bushings
- National Metal Molding Co.

Bushings, Case Hardened and Manganese
- Bemis Car Truck Co.

Bushings, Graphite and Wooden
- Bound Brook Oilless Bearing Co.

Cables (See Wires and Cables)

Carbon Brushes (See Brushes, Carbon)

Car Panel Safety Switches
- Westinghouse Elec. & Mfg. Co.

Cars, Dump
- Differential Car Co.

Cars, Passenger, Freight, Express, etc.
- American Car Co.
- Brill Co., The J. G.
- Cambria Steel Co.
- Kuhlman Car Co., G. C.
- McGuire-Cummings Mfg. Co.
- National Ry. Appliance Co.
- St. Louis Car Co.
- Wason Mfg. Co.

Cars, Second Hand
- Electric Equipment Co.

Cars, Self-Propelled
- Electric Storage Battery Co.
- General Electric Co.

Castings, Brass, Composition or Copper
- Ajax Metal Co.
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
- American Bridge Co.
- American Steel Foundries
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Standard Steel Works Co.
- St. Louis Car Co.

Castings, Malleable and Brass
- Amer. Brake Shoe & Fdry. Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.

Catchers and Retrievers, Trolley
- Ackley Brake & Supply Corp.
- Electric Service Supplies Co.
- Ohio Brass Co.
- Wood Co., Chas. N.

Ceiling, Car (See Headlining)

Change Carriers
- Galef, J. L.

Circuit Breakers
- Automatic Reclosing Circuit Breaker Co.
- Cutter Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
- Anderson Mfg. Co., A. & J. M.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- Eureka Co.
- General Electric Co.
- Hubbard & Co.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
- Brill Co., The J. G.
- Ohio Brass Co.

Cleats
- National Metal Molding Co.

Clusters and Sockets
- General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

Coils, Armature and Field
- Cleveland Armature Works
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
- Electric Service Supplies Co.
- International Register Co., The
- Johnson Fare Box Co.

Commutator Slotters
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
- General Electric Co.

Commutators or Parts
- Cameron Electrical Mfg. Co.
- Cleveland Armature Works
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Compressors, Air
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Ingersoll-Rand Co.
- Westinghouse Trac. Brake Co.

Compressors, Gas
- Ingersoll-Rand Co.

Concrete Products
- Massey Concrete Products Co.

Condensers
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Schutte & Koerting Co.
- Westinghouse Elec. & Mfg. Co.

Conduit Fittings
- Chicago Fuse Mfg. Co.

Conduits, Interior
- National Metal Molding Co.

Conduits, Underground
- Johns-Manville Co., H. W.

Condulets or Conduit Fittings
- Crouse-Hinds Co.

Connectors, Solderless
- Frankel Connector Co.
- Westinghouse Elec. & Mfg Co.

Controller Fingers
- Russell Mfg. Co.

Controllers or Parts
- Allis-Chalmers Mfg. Co.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- Johns-Manville Co., H. W.
- Russell Mfg. Co.
- Westinghouse Elec. & Mfg. Co.

Controller Regulators
- Elec. Service Supplies Co.

Controlling Systems
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Converters, Rotary
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
- Portable Machinery Co.

Conveyors, Coal and Ash
- Green Eng. Co.
- Portable Machinery Co.

Conveyors, Portable
- Portable Machinery Co.

Conveying and Hoisting Machinery
- Allis-Chalmers Mfg. Co.
- Columbia M. W. & M. I. Co.
- Green Eng. Co.
- Portable Machinery Co.

Copper Wire
- Anaconda Copper Mining Co.
- Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
- Brill Co., The J. G.
- Electric Service Supplies Co.
- International Register Co., The
- Roebling's Sons Co., John A.
- Samson Cordage Works

Cord Connectors and Couplers
- Electric Service Supplies Co.
- Samson Cordage Works
- Wood Co., Chas. N.

Couplers, Car
- Brill Co., The J. G.
- Ohio Brass Co.
- Westinghouse Trac. Brake Co.

Cranes
- Allis-Chalmers Mfg. Co.
- Niles-Bement-Pond Co.

Cross Arms (See Brackets)

Crossing Foundations
- International Steel Tie Co.

Crossing Signals (See Signals, Crossing)

Culvert Pipe Concrete
- Massey Concrete Products Corp.

Crossings, Frog and Switch
- Wharton, Jr., & Co., Wm.

Crossings, Track (See Track, Special Work)

Curtains and Curtain Fxtures
- Brill Co., The J. G.
- Electric Service Supplies Co
- St. Louis Car Co.

Cutouts
- Chicago Fuse Mfg Co.

Dealers' Machinery
- Archer & Baldwin
- Electric Equipment Co.
- Foster Co., L. B.
- Hyman Michaels Co.

Derailing Devices (See also Track Work)
- Cleveland Frog & Crossing Co.
- Wharton, Jr., & Co., Wm.

Destination Signs
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

Detective Service
- Wish Service, P. Edward

Dogs, Lathe
- Williams & Co., J. H.

Door Operating Devices
- Consolidated Car Heating Co.
- National Pneumatic Co., Inc.
- Safety Car Devices Co.

Doors and Door Fixtures
- Brill Co., The J. G.
- General Electric Co.

Doors, Folding Vestibule
- National Pneumatic Co., Inc

Draft Rigging (See Couplers)

Drills, Rock
- Ingersoll-Rand Co.

Drills, Track
- American Steel & Wire Co.
- Electric Service Supplies Co.
- Niles-Bement-Pond Co.
- Ohio Brass Co.

Drinking Cups, Sanitary Paper
- Individual Drinking Cup Co., Inc.

Dryers, Sand
- Electric Service Supplies Co.
- Zelnicker Supply Co., Inc., Walter A.

Electrical Wires and Cables
- American Steel & Wire Co.
- Roebling's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating
- Allison & Co., J. E.
- Archbold-Brady Co.
- Arnold Co., The
- Engel & Hevenor
- Feustel, Robert M.
- Ford, Bacon & Davis
- Hemphill & Wells
- Holst, Englehardt W.
- Jacobs & Co., J. L.
- Jackson, Walter
- Parsons, Klapp, Brinkerhoff & Douglas
- Republic Engineers, Inc.
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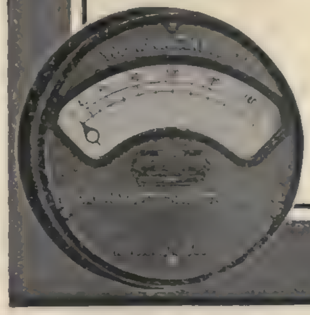

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White Engineering Corp., The J. G.

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Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Fare Boxes
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Cleveland Fare Box Co.
Johnson Fare Box Co.
National Railway Appliance Co.

Feed Water Heating
Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.

Fibre and Fibre Tubing
Continental Fibre Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & Mfg. Co.

Field Coils (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus
Johns-Manville Co., H. W.

Flashlights
National Carbon Co., Inc.

Floodlights
Crouse-Hinds Co.
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.

Forgings
Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track (See Track Work)

Funnel Castings
Wharton, Jr., & Co., Inc., Wm.

Fuses and Fuse Boxes
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

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Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.

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Ohio Brass Co.

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Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Standard Steel Works Co.

Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Westinghouse Elec. & Mfg Co.

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Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
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General Electric Co.
National Railway Appliance Co.
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General Electric Co.

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General Electric
Westinghouse Elec. & Mfg. Co.

Gongs (See Bells and Gongs)

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Morganite Brush Co., Inc.

Grates, Chain
Green Eng. Co.

Greases (See Lubricants)

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Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

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Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Guy Anchors
Crouse-Hinds Co.

Harps, Trolley
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Electric Service Supplies Co.
More-Jones B. & M. Co.
Nuttall Co., R. D.
Star Brass Works

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General Electric Co.

Ohio Brass Co.
St. Louis Car Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford-Chain Block Co.
Niles-Bement-Pond Co.

Hose
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Hydraulic Machinery
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Niles-Bement-Pond Co.

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Schutte & Koerting Co.

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Electrical Testing Lab's

Institutions, Educational
Hamilton Institute, Alex.

Instruments, Measuring, Testing and Recording
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec. Instrument Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Johns-Manville Co., H. W
Westinghouse Elec. & Mfg. Co.

Insulation (See also Paints)
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W
Mitchell-Rand Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Insulators, Section
Flood City Mfg. Co.

Insulators (See also Line Material)
Anderson Mfg. Co., A. & J. M.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Insulator Pins
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Hubbard & Co.

Jacks (See also Cranes, Hoists and Lifts)
Brill Co., The J. G.
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.

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Zelnicker Supply Company, Inc., Walter A.

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Brill Co., J. G.

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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent (See also Headlights)
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General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
Ohio Brass Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
Niles-Bement-Pond Co.

Lightning Protection
Anderson Mfg. Co., A. & J. M
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

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Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co
Eureka Co.
General Electric Co.
Hubbard & Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Loaders, Wagon, Truck or Car
Portable Machinery Co.

Locking Spring Boxes
Wharton, Jr., & Co., Wm.

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Brill Co., The J. G.
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & Mfg. Co.

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Galena-Signal Oil Co.
Universal Lubricating Co.

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Universal Lubricating Co.

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Niles-Bement-Pond Co.

Machine Work
Columbia M. W. & M. I. Co.

Manganese Steel Castings
Wharton, Jr., & Co., Wm.

Manganese Steel Special Track Work
Wharton, Jr., & Co., Wm.

Meters (See Instruments)
Electric Service Supplies Co.

Mirrors for Motormen
Drew Elec. & Mfg. Co.

Molding, Metal
National Metal Molding Co.

Money Changers
Galef, J. L.

Motormen's Seats
Electric Service Supplies Co.
Wood Co., Chas. N.

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Motors and Generators, Sets
General Electric Co.

Nuts and Bolts
Allis-Chalmers Mfg. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.
Lackawanna Steel Co.

Ohmmeters
Weston Elect'l Instrument Co.

Oil Burning Equipment
Schutte & Koerting Co.

Oils (See Lubricants)

Oxy-Acetylene (See Cutting Apparatus)

Packing
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Paints and Varnishes (Insulating)
Johns-Manville Co., H. W
Mitchell-Rand Mfg. Co.

Paints and Varnishes (Insulating)
Ackley Brake & Supply Corp.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.

Panel Boards
Crouse-Hinds Co.

Paving Material
American Brake Shoe & Fdry. Co.

Pickups, Trolley Wire
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Pipe Fittings
Power Specialty Co.
Standard Steel Works Co.
Westinghouse Traction Brake Co.

Planers (See Machine Tools)

Pliers, Insulated
Electric Service Supplies Co.

Plugs
National Metal Molding Co.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Reinforcing
Hubbard & Co.

Poles, Metal Street
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Hubbard & Co.

Pole Sleeves
Drew Elec. & Mfg. Co.

Poles, Ties, Post, Piling and Lumber
Duncan Lumber Co.
Page & Hill Co.
Southern Cypress Mfr's. Assn.

Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Electric Railway Equipment Co.

Poles and Ties Treated
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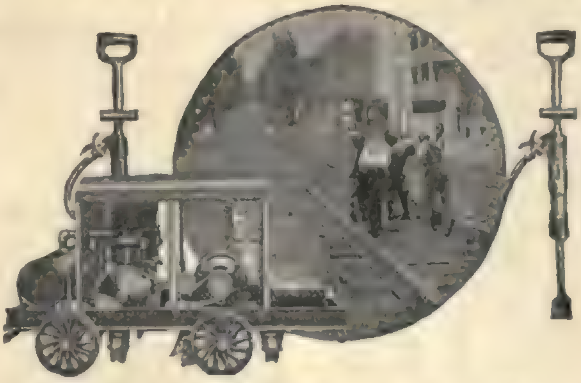

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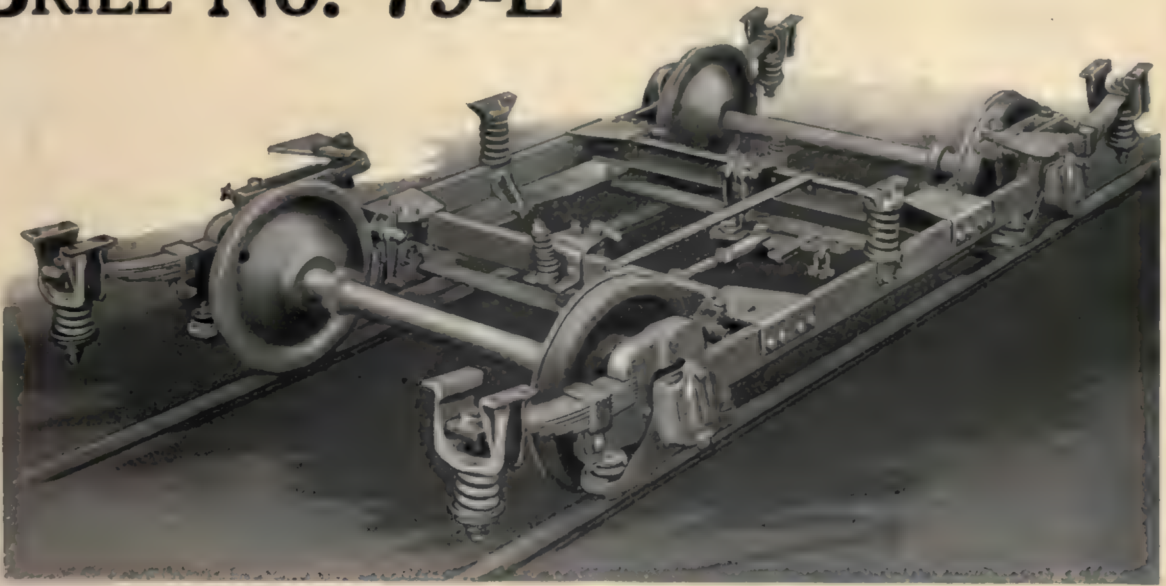
- Armature and field coils
- Bearings (axle and armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, rigging, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or malleable iron)
- Grid resisters
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

A Safe Truck for the Safety Car
Brill No. 79-E



Solid-forged Sideframes and Safety Features in Brake Rigging Insure Safety at all Times

In addition to its steady and most comfortable riding qualities the Brill Standard Birney Safety Car Truck No. 79-E is also qualified for its particular service by its construction with Solid-forged Sideframes, indicative of strength, and which safeguard it against disastrous breakdowns.

Then, the brake rigging is now constructed with the safety box jaw clevis with bolts in the pull lever to prevent it working out of position.

The Brill No. 79-E is a safe truck for the Safety car.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — ST. LOUIS MO.
G. C. KUHLMAN CAR CO. — CLEVELAND, OHIO.
WASON MANF'G CO. SPRINGFIELD, MASS.

The success or failure of any motive mechanism is dependent directly upon the reliability of its component parts.

Safety Cars in Terre Haute, Indiana.

CP25. 10 Ft Air Compressor

G-E 264. Sleeve Bearing Motor.

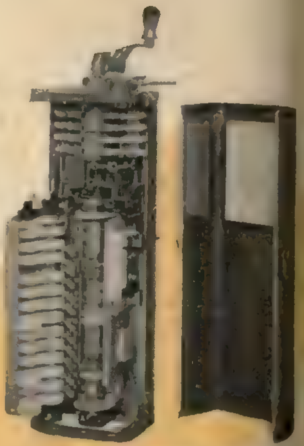
And So With the Safety Car

Paralleling the great success of the Safety Car is the success of the G-E 258 and G-E 264 motors, the K 63 Controller and the CP 25 Air Compressor, which are standard equipment on the vast majority of these cars.

The G-E 258 ball bearing motor and the G-E 264 sleeve bearing motor have stood up so well under the higher rates of acceleration and varying loads that they are now widely installed on quadruple equipment to secure faster schedules.

But no safety car can give the utmost in shopless or revenue miles per annum without a good air compressor. The constant use of air for door, step and safety interlocking demands greater reliability than air brake operation alone, and this demand is best filled by the CP-25 Compressor.

G-E 258. Ball Bearing Motor



K63. Controller.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

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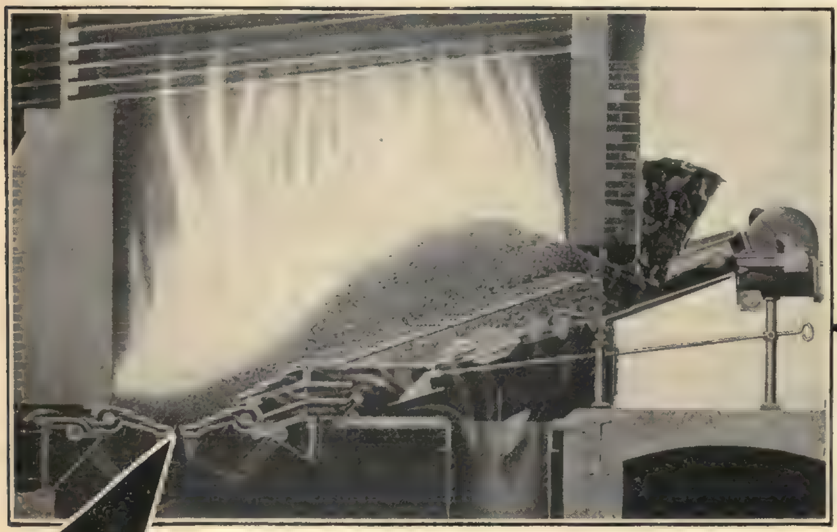

"If you consider your coal at its cash value, the unburned coal in the ash is like small change."

—Industrial Power
Sept. 1920

The "small change" of the Boiler Room is the unburned fuel that passes over the dump grate.

100% Air Distribution prevents the loss of this "small change."

100% Air Distribution means that the Westinghouse Underfeed Stoker is a stoker through and through—that every square foot of grate surface is active grate surface from front wall to bridge wall.

100% Air Distribution means that the DUMP GRATE is not dump grate ONLY—it is ACTIVE GRATE SURFACE to be used when needed. It is supplied with air so that every particle of unburned fuel reaching it may be efficiently consumed.

No "small change" passes over the dump grate of the Westinghouse Underfeed Stoker.

Ask for Leaflet 3985 describing the Westinghouse System of Air Distribution.

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WESTINGHOUSE
ELECTRIC

Westinghouse

UNDERFEED OVERFEED AND CHAIN GRATE STOKERS.

Vol. 56, No. 23 New York, December 4, 1920 *Pages* 1133-1178

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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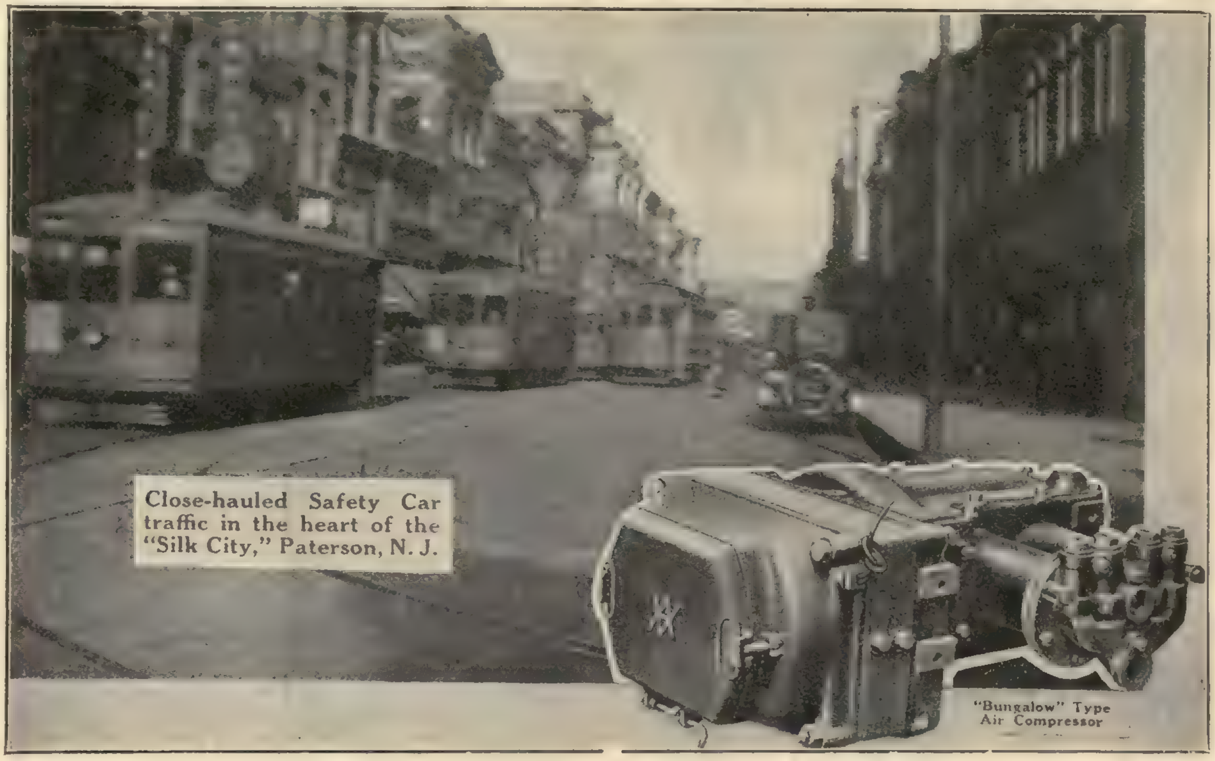


Close-hauled Safety Car traffic in the heart of the "Silk City," Paterson, N. J.

"Bungalow" Type Air Compressor

Excellent Performance Brings Its Reward

"Bungalow" Air Compressors that were selected for the entire number of 200 Safety Cars recently purchased by the Public Service Corporation of New Jersey will serve the State's largest cities, Newark, Plainfield, Paterson, Passaic, Jersey City, Hoboken, Elizabeth and New Brunswick. This is but one of many cases where excellent performance has brought its reward to the "Bungalow." All the largest orders specify "Bungalows"—Brooklyn, 200; and Eastern Massachusetts, 250.

To date 187 electric railways throughout the country have applied "Bungalows" to 3330 Safety Cars.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

TRADE MARK

New York
San Francisco

Washington

Chicago
St. Louis

And now it's BALTIMORE that finds the Safety a Success

What a contrast to the idea that the Birney Safety Car is just a light service proposition is afforded by the fact that the United Railways & Electric Company of Baltimore starts off its SAFETY SERVICE on this kind of a route (Fremont Avenue).

Twenty-two track intersections, twenty-four transfer points and twenty-four compulsory stops within a distance of three and four-tenths (3.4) miles.

Such conditions can be satisfied safely only by the use of the Safety Devices combination which takes out the *labor* but puts in *speed* and *safety* in the frequent stopping and starting of the car and the opening and closing of the doors of the car.

Whether your service requirements are less or more severe than those set by Baltimore's first Safety Car line, we ask you to bear in mind that no car is a Safety Car unless it is equipped with automatic, laborless apparatus, so interlocked that regardless of the illness or distraction of the operator the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, they are Safety Cars only when the doors must be closed and the step folded before the car can start, and when the air brake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

SAFETY CAR DEVICES COMPANY

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO
Railway Exchange Bldg.

WASHINGTON, D. C.
Munsey Bldg.

NEW YORK
City Investment Bldg.

PITTSBURGH
Westinghouse Bldg.

SAN FRANCISCO
Southern Pacific Bldg.
CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.

Phono-Electric

In England's Great Seaport

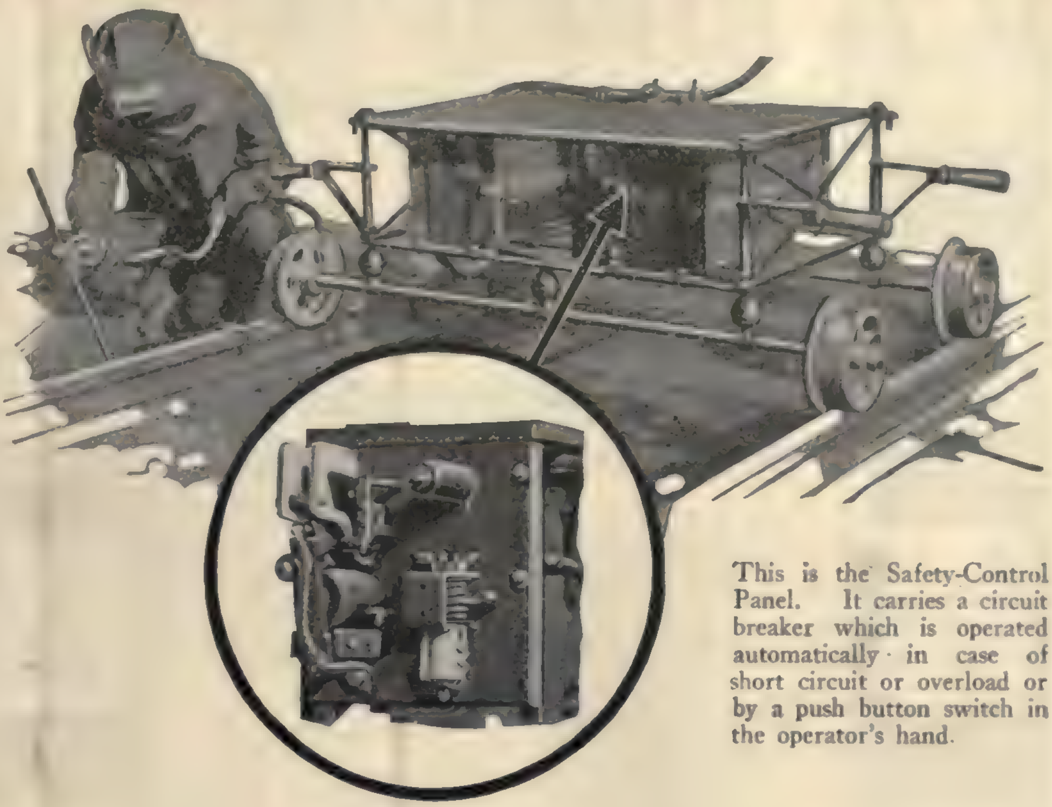
Hull's docks cover over 168 acres. And access to them is through narrow, crooked streets of great antiquity.

The problems of trolley service in such locality are naturally great. That is one reason why the tram companies selected trouble-free line work and use Phono-Electric extensively—not only to reduce maintenance costs, but to keep the repair wagon out of the trucking traffic.

Bridgeport Brass Company
Bridgeport Connecticut

2192A

O-B ARC WELD BONDING



This is the Safety-Control Panel. It carries a circuit breaker which is operated automatically in case of short circuit or overload or by a push button switch in the operator's hand.

How O-B Machine and Bond Help the Operator Speed Up

Right under the operator's thumb is a push-button that controls the O-B Resistance Arc Weld Machine.

Click—the current is on, ready for welding.

Click—the current is off.

Because control is so easy the operator can work fast without taking chances.

With O-B Bond the weld is made from "Steel to Steel with Steel," the easiest electric welding.

The bond makes a ninety degree angle with the rail. The welder can see what he's doing. He can get a full area weld.

Send for "O-B Arc Weld Bonding"

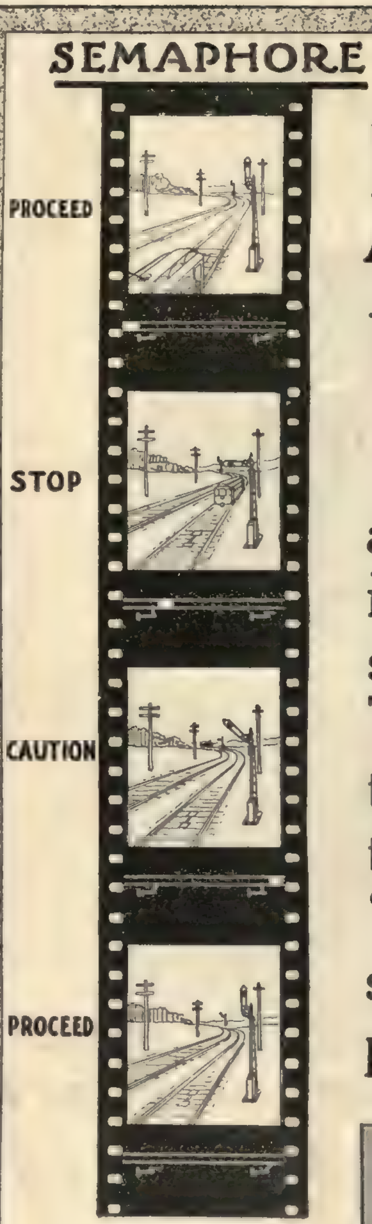
If you have a welding machine you can use it to install O-B Bonds. Get their advantages at least.

O-B Type AW3 Patented
For ball of rail.

The Ohio Brass Company
Mansfield, Ohio

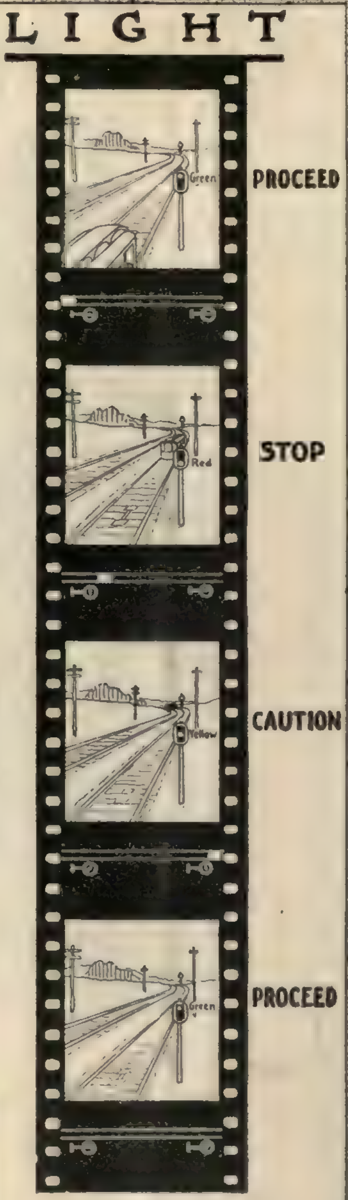
New York. Pittsburgh. Chicago.
Philadelphia. San Francisco.
Los Angeles. Paris, France

Manufactures:
Rail Bonds, Trolley Materials,
High Tension Porcelain Insulators,
Third Rail Insulators,
Electric Railway Car Equipment
Materials



FOR DOUBLE TRACK
Interurban Railways

Union automatic
▪ block signals ▪
afford a simple system of indications easily understood by trainmen.
The continuous A. C. track circuit makes possible the use of "polarized" or "wireless" control and insures the display of the proper indication at all times.



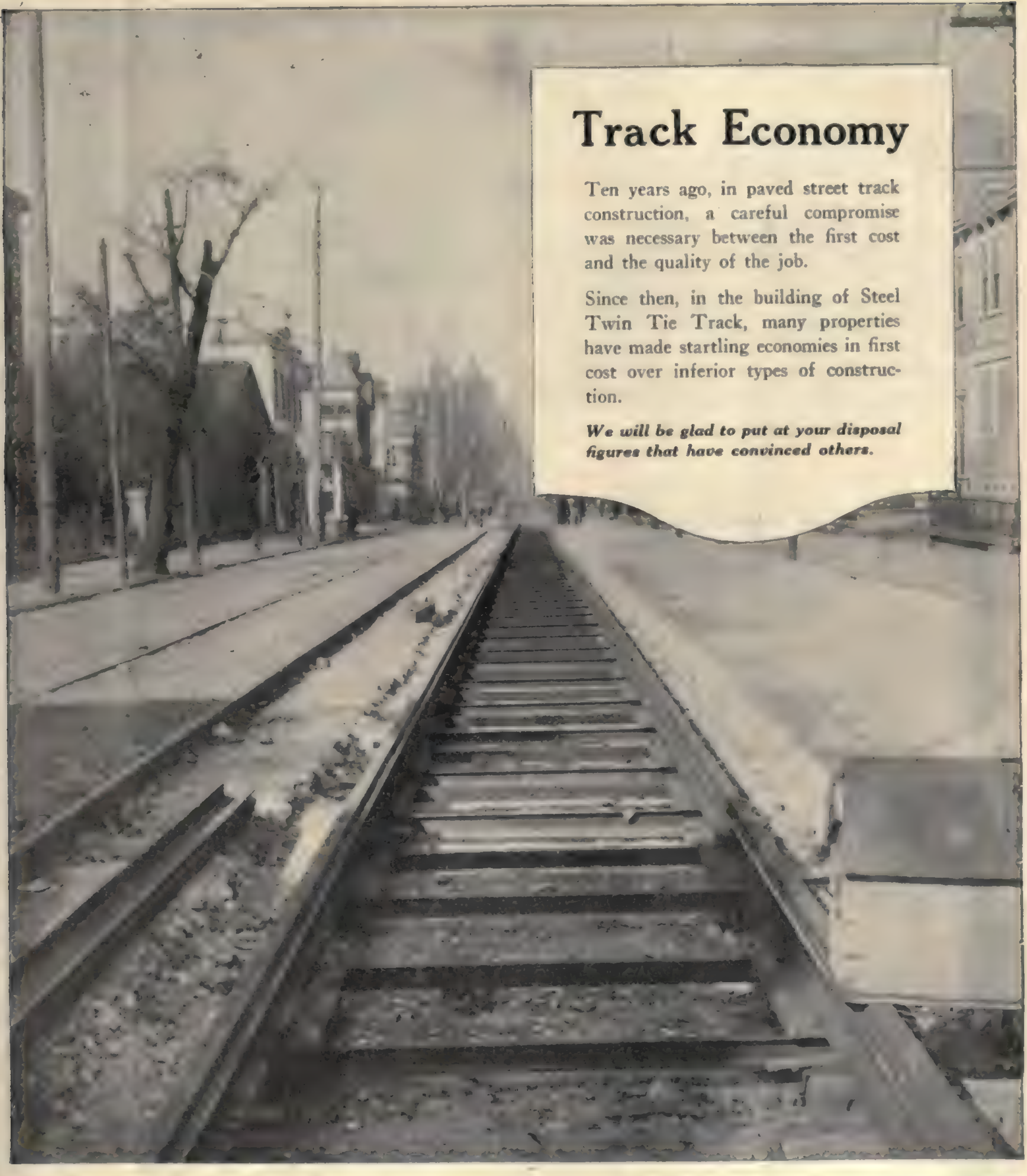
On the New York State Railways

On the Oakland, Antioch and Eastern

UNION EQUIPMENT WILL SOLVE YOUR INTERURBAN TRAFFIC PROBLEMS

Let us study your operating conditions and cooperate with you in considering what *automatic block signaling* will do for *your line.*

Trade Mark
Union Switch & Signal Co.
Trade Mark
SWISSVALE, PA.



Track Economy

Ten years ago, in paved street track construction, a careful compromise was necessary between the first cost and the quality of the job.

Since then, in the building of Steel Twin Tie Track, many properties have made startling economies in first cost over inferior types of construction.

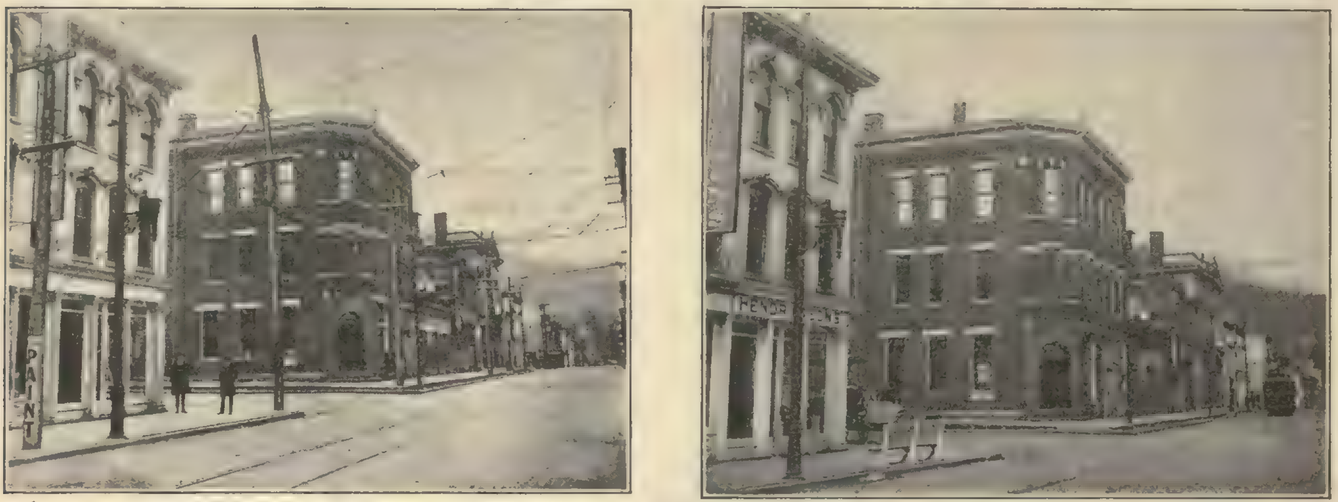
We will be glad to put at your disposal figures that have convinced others.

Steel Twin Tie Track

THE INTERNATIONAL STEEL TIE CO.

16702 Waterloo Road

Cleveland, Ohio



Maysville, Kentucky, showing street scene before and after Elreco Combination Railway and Lighting Poles were installed.

Sell Your City the Idea of a "White Way" and It Will Pay for Itself

Even bugs swarm by the hundreds around a brilliantly lighted lamp. It is only natural for them to do so. But, human beings are no different from these insects in this respect.

Well lighted streets attract crowds but darkened streets are forbidding and deserted. Every city wants a brilliantly lighted business center. The public like it and swarm to it. Nor are they content unless they can visit shops, stores, movies and restaurants. Commercial interests find that it pays them such good returns that they are willing to share in the cost of securing it.

But, where does the railway come in?

A city that has a real "White Way," a main thoroughfare with brilliant night lighting, will be crowded and the railway will carry the crowds.

Very often the Chamber of Commerce is just the right body to start a 50-50 proposition with the Street Railway to share in the expense of securing a regular "White Way" and of getting rid of the tangled web of wires and unsightly crooked poles. It takes but little to start such a scheme in your city.

But when they do, they'll pick the best and at the same time the most economical poles—the "Elreco" combination Railway and Lighting Poles.

Write for Catalog "F" showing actual photographs of "Elreco" Combination Railway and Lighting poles installed in many cities.

Electric Railway Equipment Company

Cincinnati, Ohio

30 Church Street, New York City

Specify These Keystone Specialties When You Buy Safety Cars.

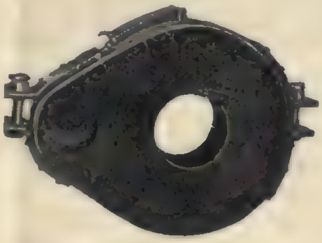
Golden Glow Headlights

Keystone Rotary Gongs

Keystone Air Sanders

Keystone Trolley Catchers

Faraday Car Signal Systems

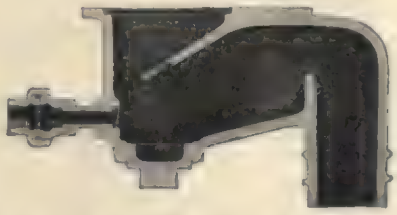

Keystone Steel Gear Cases

Keystone-Hunter Destination Signs

Always specify them for they will serve you well. Write for Bulletin No. 167, showing many other Keystone specialties for use on safety cars.

Keystone Air Sanders

Keystone Air Sander


Cross Section View of Keystone Air Sander

Vastly better than the old box with a pipe through the floor.

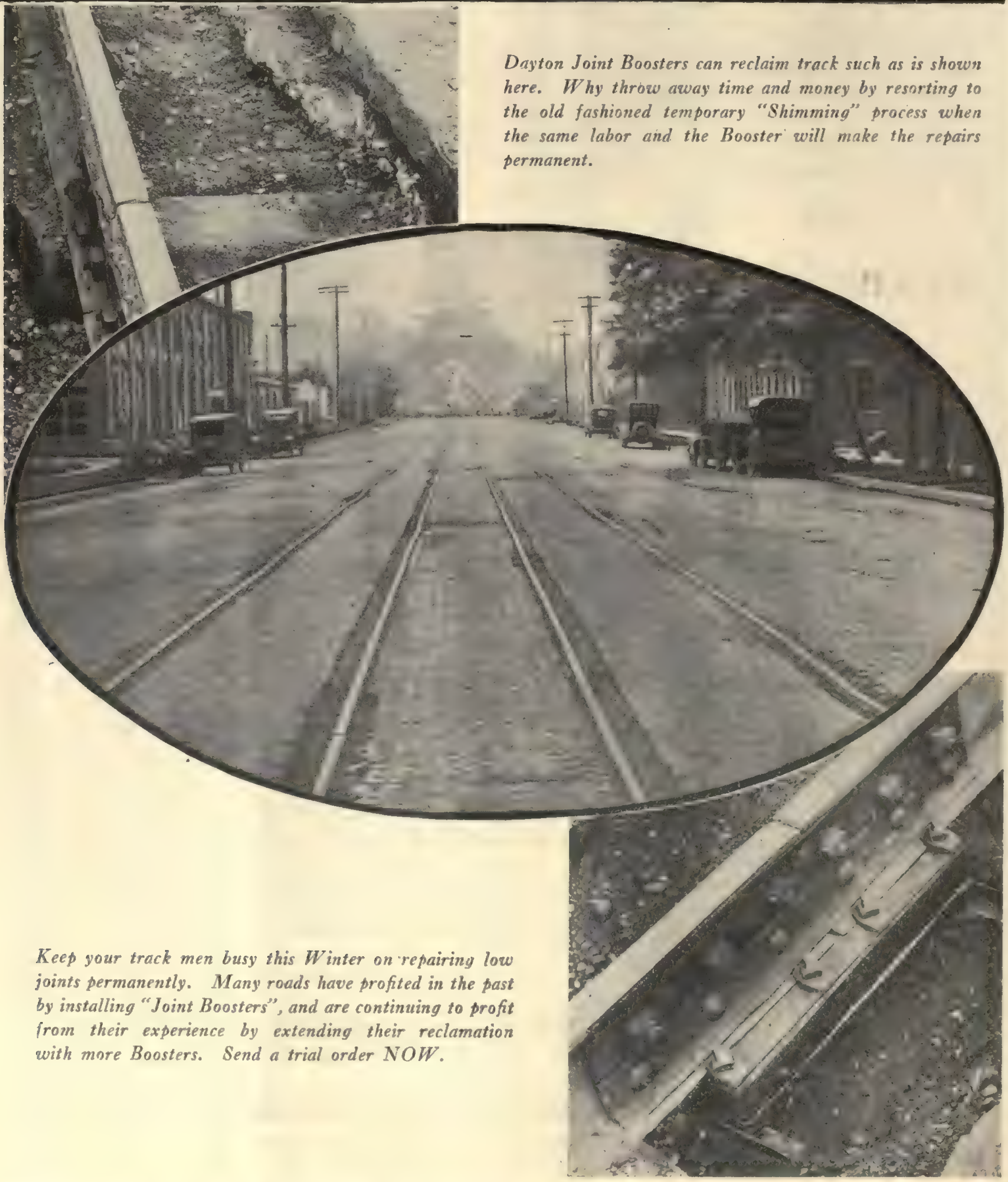
These improved traps operated on the brake air line enable the motorman to "shoot" a charge of sand to the contact point of wheel and rail quickly and positively. Safety, economy of time and sand are assured and there is nothing in the apparatus to wear or get out of order. They are made of malleable iron, cast in one piece with a shelf to carry the weight of sand and keep it from packing. A plug in the bottom provides for cleaning. The spouts have two lugs to attach the wire hose to lead the sand to the rail.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	NEW YORK	CHICAGO
17th and Cambria Streets	50 Church St.	Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto



Dayton Joint Boosters can reclaim track such as is shown here. Why throw away time and money by resorting to the old fashioned temporary "Shimming" process when the same labor and the Booster will make the repairs permanent.

Keep your track men busy this Winter on repairing low joints permanently. Many roads have profited in the past by installing "Joint Boosters", and are continuing to profit from their experience by extending their reclamation with more Boosters. Send a trial order NOW.

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

PETER WITT TYPE MOTOR CAR FOR ST. LOUIS, HAVING ONLY TWO STEPS

Enter St. Louis for Safety Interlocking Door Control

The "Mound City" they used to call it in the old days, but St. Louis deserves a liver title than that to express its spirit of hustle.

And now St. Louisans will be able to hustle in perfect safety, for the United Railways of St. Louis has ordered National Pneumatic Safety Interlocking Door Control for fifty new Peter Witt motor cars, for fifty new center-entrance, center-exit trailers of Peter Witt front lobby type and for several score remodeled cars.

As for the motor cars—they'll also be equipped with the now nearly universal National Pneumatic Door and Step Control!

We are yours for laborless safety and speed.

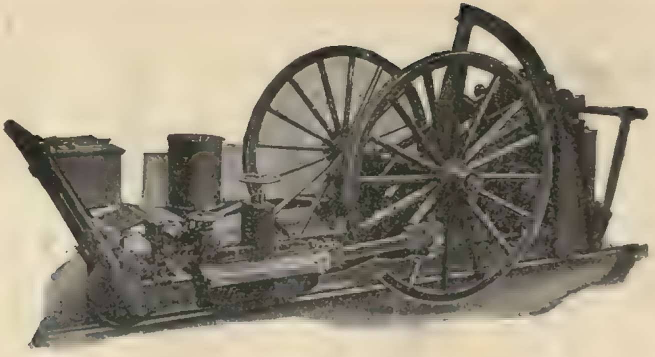
Make your peak periods produce maximum profit and efficiency

National Pneumatic Company, Inc.
50 Church St., New York **Edison Bldg., Chicago**
Works: Rahway, N. J.

You—
have your track grinding troubles

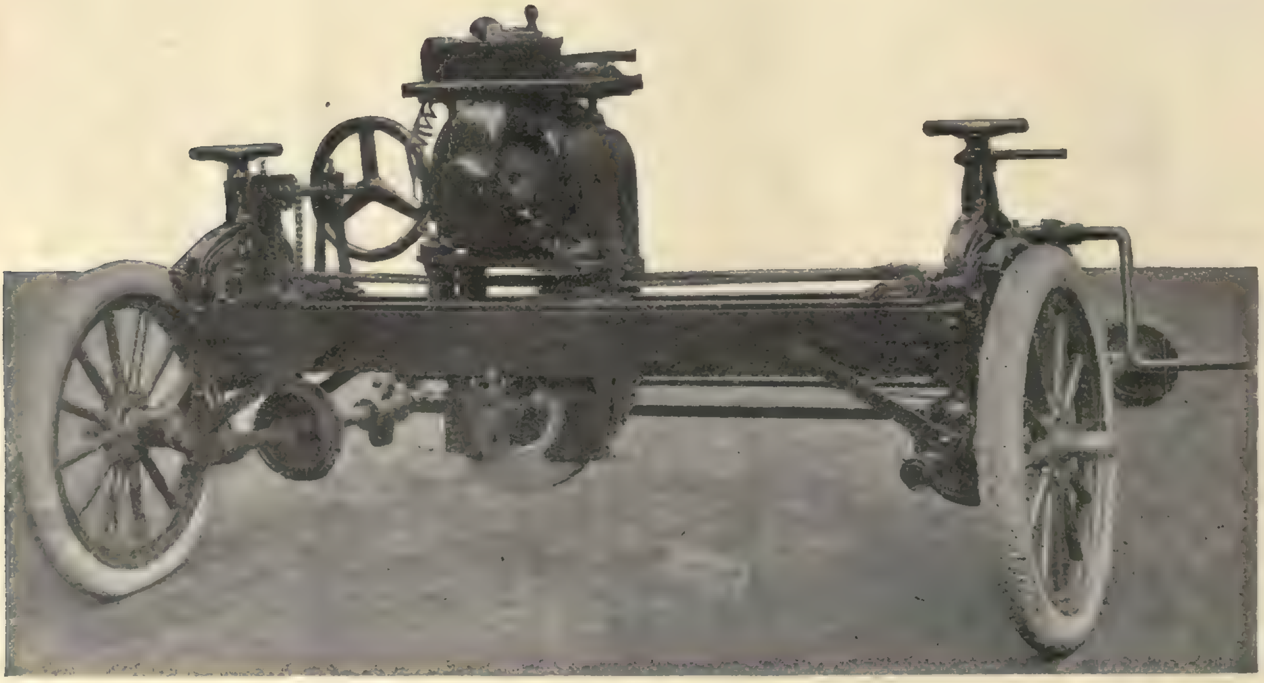
We—
have the Equipment to handle them

Why not let us work together ?



Reciprocating Track Grinder

Atlas Rail Grinder



Universal Rotary Track Grinder

RAILWAY TRACK-WORK COMPANY

3132-48 East Thompson St., Philadelphia

Exclusive Agents—

ATLAS RAILWAY SUPPLY CO.,
Chicago, Ill.

ELECTRICAL ENGINEERING &
MANUFACTURING CO.,
Pittsburgh, Pa.

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Boston, Mass.

Exclusive Agents—

HITCHCOCK, LLOYD & CO., Inc.
77A Queen Victoria St., E. C.,
London, England.

"SHELBY"

SEAMLESS STEEL TROLLEY POLES

Reinforced where reinforcement is needed, without adding superfluous weight or sacrificing resiliency.

THE standard "SHELBY" Poles are made from 13 gauge material, as years of practical experience have shown that a lighter gauge may fail by local injuries, and a heavier gauge simply adds to the weight of the pole without increasing its strength to a corresponding extent. The theoretical requirement for a pole of minimum weight points out a method for increasing the strength of the pole without a proportionate increase in the weight. This method consists of the use of a reinforcement at the base end and on the inside of the 13 gauge member.

Recent improvements have been made in the methods of manufacture, particularly in the method of inserting the reinforcement. As now made, the reinforcement is integral with the body of the pole, which adds materially to its efficiency.

Ask for Booklet—The "SHELBY" Seamless Cold Drawn Steel Trolley Pole.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

General Sales Offices: Frick Building

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Atlanta Boston Chicago Denver Detroit New Orleans New York Salt Lake City Philadelphia Pittsburgh St. Louis St. Paul

PACIFIC COAST REPRESENTATIVES: U. S. Steel Products Company San Francisco Los Angeles Portland Seattle

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Get extra rail service without extra investment

Getting rails with a good wearing surface under steady traffic and safe from cracking and fracture under the severe stresses of present-day heavy wheel loads is one of the maintenance-of-way engineer's greatest problems.

Aside from chemical composition, which is now well standardized, one of the biggest factors in rail life and safety is the presence on the rail of an outer layer or skin of partially decarburized and weak surface metal that in the ordinary process of rolling remains in the finished product.

This means that the comparative softness of the bearing surface on the rail head invites undue wear and sloughing off to one side, while the conversion of air cells and impurities in the original ingot surface into streaky, laminated outside metal, leaves weak spots in the rail base, where under flexure and stresses from load, the seams tend to open, enlarge and ultimately weaken the rail to the degree of fracture.

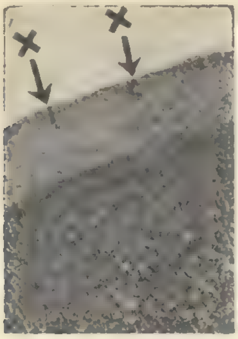


Figure 1

The Lackawanna Deseaming Process is the first and only successful method of overcoming these faults, and like many other important improvements is extremely simple in theory and in application.

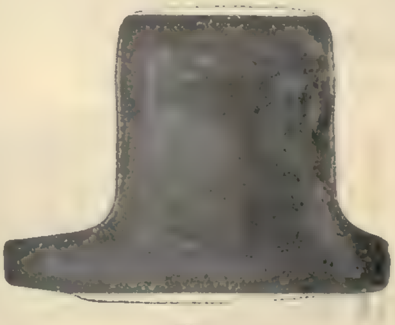


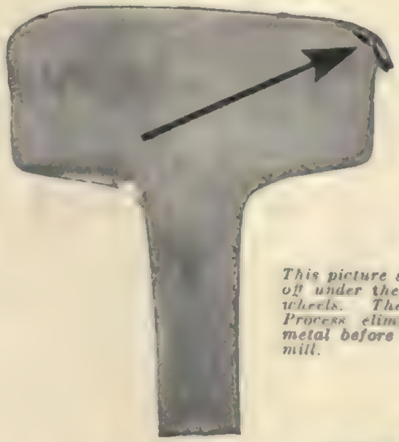
Figure 2

The two detail pictures tell the story. Figure 1 is a full-sized photo reproduction of a section cut from a steel ingot, polished and etched. The soft, partly decarburzed skin metal, which has been subjected to various oxidizing processes while the ingot was in the soaking pit, is clearly differentiated from the harder interior metal by its lighter color. At X X are shown two incipient seams, originally air bubbles formed as the ingot was poured into the mold. When the ingot is rolled this soft skin metal, with all the surface flaws, is stretched out thinner and thinner, and the air holes become seams.

The Lackawanna Deseaming Process hot-mills off this soft, streaky skin metal at the two critical locations, the rail head and base (see Figure 2) at a point in the rolling process just after the bar has passed through the roughing passes. The finishing rolls therefore do their work on the hard interior metal which is free at the base from seams that spread under flexure in service, and free at the head from the soft spots that otherwise wear into depressions or slough off under the cold-rolling action of the wheels in service.

Rails treated by the Lackawanna Deseaming Process are obtainable at no greater first cost than for ordinary rails but will show a decided saving in maintenance.

If you wish to know in detail about the greater load capacity and safety assured by this process, send for our interesting book.



Better Service

This picture shows a rail head sloughed off under the cold-rolling action of the wheels. The Lackawanna Deseaming Process eliminates this weak surface metal before the rail is finished in the mill.

Greater Safety

This picture shows a typical base seam—the kind that tends to open up and cause fracture. The Lackawanna Deseaming Process prevents rail failures by eliminating the weak surface metal which causes such seams.

For Railroad Construction Work

Lackawanna

Steel Sheet Piling

Thousands of tons of Lackawanna Steel Sheet Piling are used by American Railroads for construction and permanent protection of bridge piers, temporary and permanent retaining walls, grade elimination work, etc. Maintenance departments which keep a stock of Lackawanna Sheet Piling on hand as permanent equipment find this material an invaluable help in repairing washouts and for other emergency jobs.

DOUBLE-LOCK
LACKAWANNA
INTERLOCK

Lackawanna Sections are made in a wide range of types and sizes from which one can be selected for safety and economy under practically any conditions.

The Lackawanna Flexible Interlock is not only superior in strength and watertightness but permits obstructions in the piling line to be passed without undue deflection and is adapted to the construction of irregular walls and small circular enclosures.

Our Sheet Piling Engineers will gladly cooperate with railroad construction officials in determining the most desirable methods and sections for difficult work and will submit valuable cost data.

Elcannes

Concrete Reinforcing Bars

The broad and deep depressions at regular intervals in the bar surface take the place of excess and waste metal comprising the projections on ordinary types of deformed bars.

The bonding surface of the Elcannes Bar is 15 per cent greater than that of a plain square bar of the same nominal size.

The Elcannes Bar is uniformly designed, the deformations being so arranged on opposite sides of the bar that a practically unvarying cross-sectional area is maintained.

The regular surface and uniform section render handling easy and reduce the difficulty of fabrication or bending in shop or field.

The Elcannes Bar is manufactured exclusively by the Lackawanna Steel Company. Send for complete information.

Lackawanna Steel Company

General Sales Office and Works: Lackawanna, N. Y.

Boston Buffalo Chicago Cincinnati Cleveland Detroit New York Philadelphia St. Louis San Francisco

Sole Exporter of Our Commercial Products: Consolidated Steel Corporation, 165 Broadway, New York.

SOLE EXPORTER OF OUR COMMERCIAL PRODUCTS CONSTECO CONSOLIDATED STEEL CORPORATION 165 BROADWAY NEW YORK, U.S.A.

The illustration above gives a comprehensive view of our large Layout Yard, where Special Track Work is assembled and carefully fitted together, to avoid any possibility of trouble during installation. No piece of work leaves our plant without such careful fitting.

TRACK WORK

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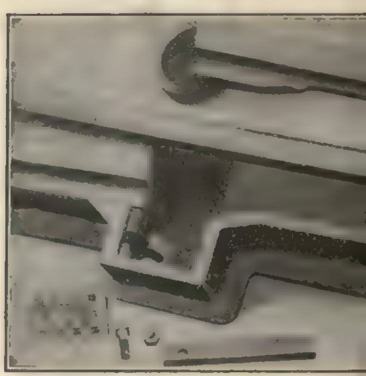

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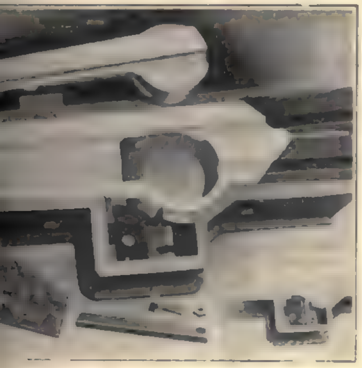

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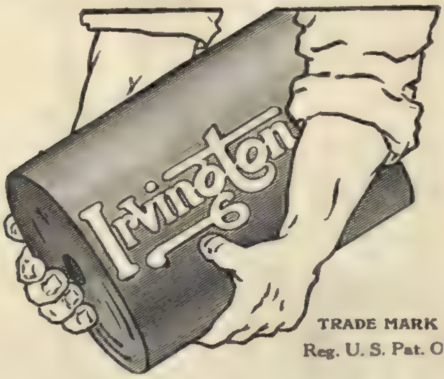

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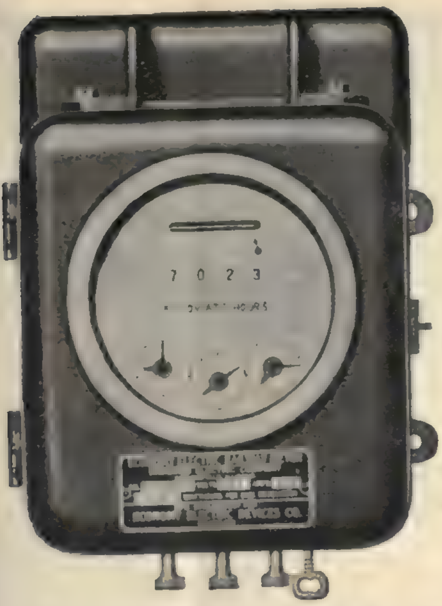

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Our Films Must Entertain—Not Preach

THE round-table discussion now going on in our columns on film publicity, scenarios and distribution is, for the most part, an encouraging indorsement of our suggestion that the "movie" be used to reinforce railway publicity work. It is rather a pity that electric railway endeavor in the use of this all-pervasive medium of publicity and propaganda has been so very limited. Safety films were the earliest to get some circulation, and they were most effective. The safety-car picture was the first attempt to use the film in a national way, yet this film was considered by many operators to have too much "love interest" in it. For all that, a film that has some "love interest" is the one sure magnet to draw the public.

In any case, all electric railway films except one or two that we have seen have been obviously "preachy" in character. It is a cruel fact that people don't like to be preached to, and they become restive whenever a downright educational celluloid, such as "Snowshoeing in Siberia" or "Making Codliver Oil at Lofotem," reels beyond a few hundred feet. If they feel that way about the strange and distant, we must give them something well-sugared indeed when the familiar, commonplace electric railway is to be "put over." It must be a film "story" first and contain information incidentally.

The motor-truck people have sponsored such a lot of good pictures that we shouldn't be ashamed to study and emulate, if not imitate, their clever methods. The following account of one film which we paid real money to see on Broadway, and which we enjoyed, too, will explain without any preachments on our part what we have in mind:

Sam Mucilage has evolved a motor truck that can do anything, apparently, except sign contracts for its sale in large quantities. He has a dozen trucks or so on hand with no takers. Finally, he has no use for his beautiful daughter's sweetheart because the latter is more fond of driving racing automobiles than demonstrating motor trucks. It's the night before Christmas when word is flashed to town that the waters of the great dam in the mountains are ready to flood the valley. Our racing hero leads a cavalcade of Mucilage Motor Trucks through a most terrifying ordeal of bad roads, stiff grades and tropic rainstorms. Of course, he arrives with the dynamite, etc., just in time to rescue the dam and his sweetheart, who is at a mountain party. Both trucks and suitor have made good. Father gets that long-sought-for order from the Pink Pickles Company. Everybody is happy, including the audience, which goes away with this psychic complex in its mind: "Rotten roads; useful motor trucks; better highways are absolutely essential to all."

Electric railways also can do this sort of thing. However, they will not only have to co-operate for that purpose because of the expense involved, but must also be willing to listen to what the professional amusement purveyor has to say in confirmation of Pope's dictum that "men (and women and children, too) must be taught as if you taught them not."

Are Our Cities Too Big?

ARE our cities too big, and in our cities are we attempting too great concentration of business and living in certain preferred districts? These were pertinent questions raised at the recent meeting of the New York section of the American Society of Civil Engineers, at which the transportation plans of New York City were discussed. The connection between these subjects and transportation is obvious, because if it was not for cheap and rapid transportation it would be impossible for large numbers of the workers in the offices and factories of our modern cities to live any considerable distance away from their places of employment. In fact, it is rapid transportation which has made possible such a condition as exists in lower Manhattan or the central business districts of any large city with skyscrapers each housing thousands of workers.

Independent of whether such a development is desirable and marks a step forward in social economies or not, it is well that questions of this kind are raised. Too often there is a tendency in municipal development, as in other things, blindly to follow custom, especially when it may coincide with individual gain, rather than to consider the matter from the broad standpoint of the whole community.

It must be recognized that some cities have already taken steps to prevent congestion of this kind through a limit set on the height of buildings. Primarily this limit may have been placed so that no building will deprive neighboring property of too large a proportion of its light and air and possibly also because of the fire risk. Nevertheless, this limit on building height does have the effect of spreading out a district and reducing the concentration. Again, there is a growing tendency among modern community dwellers to establish their places of business in different parts of the city according to industries, and presumably there is an economic reason for such a practice. If so, would it be a backward step to go back to small communities or community centers where this association of like workers could not prevail?

The problem is one which can well receive the attention of the experts on this subject, the city planners. This much, however, might be said in connection with transportation so far as it relates to this subject. So many good reasons may be urged against concentration in our large cities that any settled policy under which transportation is supplied at less than cost to encourage concentration should be adopted only after careful consideration. In other words, if the passenger pays the full fare which it costs to produce the transportation which he uses, concentration at least is not being subsidized through the transportation system.

Let's Have Fair Dealing and an Era of Co-operation

WE REFERRED last week to the new and constructive attitude taken by labor as evidenced by the remarks of Matthew Woll and others in Washington during the week ended Nov. 20. That there should be a beneficial result from this invitation of labor to the engineers to work for the solution of the industrial, or the labor-capital, problem is to be hoped by all. That labor is taking the initiative is most important.

While one cannot but note that this friendly attitude did not come so long as labor was in a dominant position, it is of particular importance now that employers should not take advantage of their increasingly favorable position. In times past capital has had its day, and, to be candid, it was then little less selfish in its motives than labor has been during the last few years. Now that each has had its turn is it not about time that employers as well as employees should honestly try to be perfectly fair in all their dealings? It is certainly true that the attitude of labor in the past has been partly inspired by the earlier near-oppression of some employers. But now that there is a demand for work and employers have more of an opportunity than for some time past to set a standard of dealing it should be on such a basis as will serve for a time when there will be another tremendous labor shortage. It is evidently with a desire for the establishment of a basis of fair play to all concerned that General Atterbury issued his recent statement this week in regard to the open shop on steam railroads. He warns that in this readjustment of conditions labor, too, should not try to secure more than its fair share in the determination of a program.

But it seems obvious that now is a propitious time to begin the upbuilding of a labor-employer relations structure that shall be so substantial as to endure any storm. The desire to begin a new era which labor manifested at the recent meeting of the American Federation of Labor is probably typical of the thinking of workmen in all lines. The receptive expressions of the American Federation of Labor, the dropping of John J. Fitzpatrick and William Z. Foster from the executive council of the federation, thus ridding it of radical leadership, and the notable speech of Herbert Hoover before American Engineering Council on labor relations are incidents indicative of the present interest of labor in the setting up of groundwork for a firm establishment of mutual confidence. This new attitude holds out promise of greater stability of industry and greater prosperity and it should be fostered and made the most of by employers generally.

In the electric railway field in particular is an era of labor peace desirable; first, because of the importance of avoiding interruption to service, and, second, to avoid the excessive loss that always accompanies a strike whether won or lost. The preservation of this peace may be difficult when the time comes for the inevitable readjustment of wage scales to lower levels, yet we hope not. Trainmen have known all along that the conditions prevailing since the war could not last indefinitely, but like most normal individuals they took all they "could get while the getting was good." This holds true in the street railway field as in other lines of work, and just as in other trades where the wages have been pushed higher there will they have to start coming down first. Conversely, at those places where wages were last to be increased there they should be last to be decreased.

The basis of the recessional movement will probably be the same as that upon which fair wages were established during the war. If that basis was fair for a rising market, it must be fair for a receding market. The irresistible laws of supply and demand will control, and they should be permitted to take a natural course. In other words, the "vicious circle" about which we heard so much during the war is still with us, but it has become a welcome circle, each basic reduction passing on around in influence and accruing to the advantage of railway employees, for wage reductions will lag far behind commodity reductions. The point is that even with reduced wages trainmen will have a bigger sum to put in their savings accounts at the end of the month than they did last year.

The thing to be guarded against by the railway managements is that no "rough work" be permitted in bringing down wage scales. The movement must come, but it must come naturally and gradually, perhaps first by lengthening out the periods of service at the lower wages in the scale for new men coming on or with an entirely new lower scale for new employees, leaving the older men at the higher scale as long as possible, and thus putting a special reward on continued service.

How soon wage reductions may be expected is very problematical, but there is one thing that may be said at this time with definiteness, and that is that any further increases in the wage level in the electric railway field would be untimely and uncalled for. In reference to the larger city properties where the closed shop is firmly implanted it is to be expected that a downward revision will be fought with demands for increases over the present scale upon the expiration of present contracts next spring. Yet from the signs of the times and the wage and even salary reductions now reported in other industries there is good reason to believe that the men will consider themselves lucky if they succeed in retaining the present scale. But when we commence to make the break toward a lower level, toward a return to normalcy, let's keep the relations absolutely fair. Then there can be no basis for trouble.

Improvement in Service Should Be an Immediate Result

PERHAPS more important than the future wage scale agreements which will be worked out between railway managements and employees, and certainly more immediately pressing, is the effect which this newly expressed attitude of labor may have on service conditions in the electric railway field. Present wages and fares have an inter-relation which complicates a modification of either, but if labor means what it says and if management is at all able to capitalize upon this and gain the complete co-operation of labor there are improvements in service conditions which should be immediately possible.

To be concrete, we know of at least one group of properties on which the average speed of cars was raised by constant effort to approximately 11 m.p.h., but with the letting down on the part of labor, coupled with the attitude of the platform men that this increase allowed the company to remove a few of its cars and with them a few men (the accuracy of this last complaint is questionable), this speed has been reduced to something over 9 m.p.h. only. There is no inherent reason why the former speed should not be maintained, and possibly an even higher speed than that. If labor is sincere in its statements, here is one way in which platform men can co-operate without waiting for any investigation by the engineers of the country.

A word to the management at this point may not be amiss in connection with increasing schedule speeds. When an increase in speed has been made such that one of the cars on a given route can be eliminated without reducing the capacity of the line, a careful study should be made to determine whether it is not possible to increase the traffic because of this very increase in speed. People want rapid service, and this desire should be capitalized to the fullest extent everywhere. Here is where the employees can help. The double effect of increased schedule speed and better "merchandising" of rides by the platform employees, through giving better service in other ways, will usually mean that all the cars can be kept on the route.

Another specific means of co-operation on the part of employees, looking toward better service, is in connection with the adoption of one-man cars on a property. The expressed desire to co-operate for more efficient and better service can be made concrete in this connection, surely. Whenever the application of one-man cars on a property is justifiable from the standpoint of service and revenue, it is surely to the advantage of labor itself to co-operate in their use. And we feel sure that, following the newly expressed program of the labor leaders, which indicates a real and straight-thinking co-operation looking toward the most efficient operation or production, this will be one way in which electric railway labor will evidence its faith in this program.

The Motor Bus and Immediate Capital Expenditures

THAT the motor bus has a place in the development of business in outlying and new sections of territory not now served by rail is a fairly well accepted statement. As to how far that usefulness extends and as to what the economic balance between motor bus and rail extension is there is by no means any agreement. But that the bus may have a greatly enlarged field today, irrespective of later developments, was indicated by R. S. Pilcher before the British Municipal Tramways Association in September. An abstract of Mr. Pilcher's remarks is given in this issue.

The point is just this: Most of these areas, in almost every community which is not now reached by rail nor served by a dependable transportation agency, have been built up since the day when it was possible to secure the capital to provide the necessary additions to permanent way. Now, however, that the war is over and the public is demanding that it be given reliable transportation and not have to depend on private automobiles, errant jitneys or pedestrianism, the problem arises as to what to do. If the transportation companies are really to do their full duty, they must provide this service.

The bus comes forward as a means of providing it. There is no doubt that capital cannot be secured today to construct the additions to rail systems, even if it were certain that that was the way to do it in each case. But with the initial investment in motor buses equal to less than one-half the initial investment in a rail system, there seems to be a way out, temporarily at least. The seriousness of permanent additions is double now on account of the high cost of almost everything. True, the buses probably cost more now than they will later, although there have been reductions in most automobile prices, and buses cost more to operate than electric cars, in most instances, but they save extraordinary capital expenditures, they allow service to be given, traffic to be built up and the community developed, and finally, they can later be moved to other territory when permanent extensions are practicable. The arguments and figures presented by Mr. Pilcher will bear close study by many American railway men.

Be Ready to Advise Your Chamber of Commerce

DURING December an unexampled opportunity will be presented in practically every city in the United States for explaining to the leading men in the community the way in which a city should treat its public utilities. This opportunity comes about through the referendum which is to be taken during December by the Chamber of Commerce of the United States on the policies which should govern the relations between communities and their public utilities. Technically this is known as "Referendum 33." Every member of the national chamber is entitled to vote on the eight questions submitted, and this vote must be received at the headquarters of the national organization in Washington on or before Jan. 3, 1921.

Under the rules of the national chamber the ballot submitted to the members has to be accompanied by a statement giving the principal reasons for and against each of the questions submitted. In this particular case the reasons supporting the "yea" side of the eight questions proposed are contained in a report submitted by the chamber's "Special Committee on Public Utilities," which includes among its members several prominent electric railway operators. An abstract of this report was published in last week's issue.

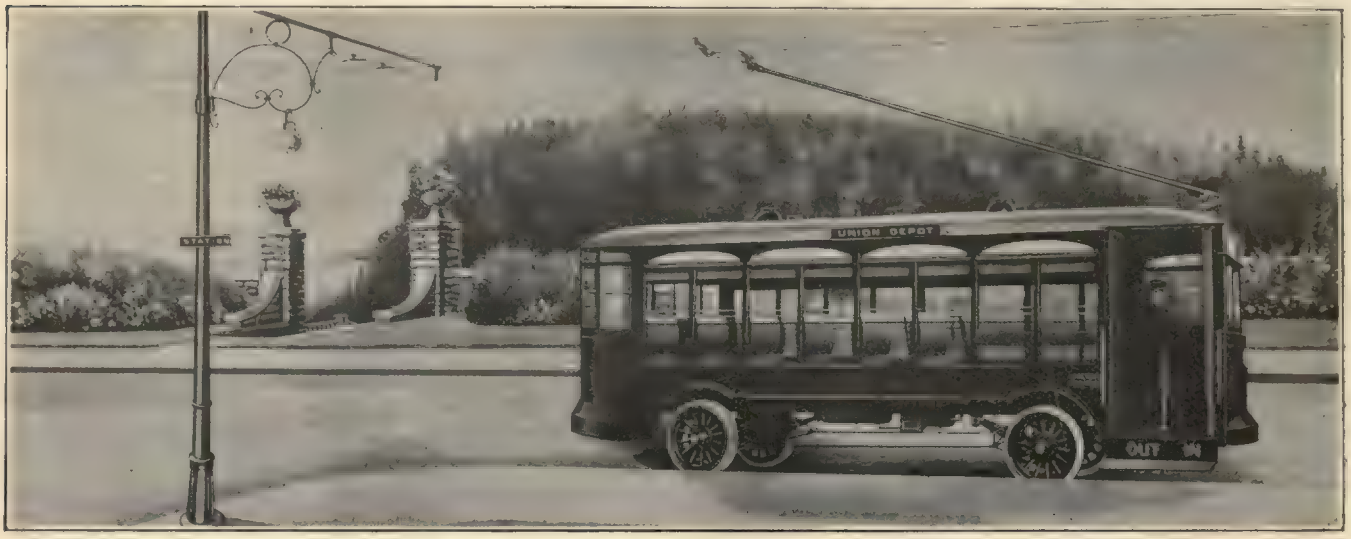
Every chamber of commerce and every board of trade in the country, member of the national chamber, will be called upon to vote on this question and should have as much information from the local utility as is necessary as a guide for its action. The report of the general committee is an excellent one, but it is no reflection on this report to say that it should be supplemented by local data at every meeting where the question is taken up. There are individuals in every community who, while perhaps willing to admit that certain policies generally should prevail, always have reasons why this policy should not be followed in the case of the local corporation.

Again, it is unsafe to assume that the needs of an enlightened policy toward the electric railway companies of the country are so self-evident as to require no argument. Obviously these truths are self-evident to railway men, who have a constant association with them, but this does not mean that they are equally clear to every one else. Electric railway managers will make a mistake if they let the vote on these questions in their own city go by default simply because they think that no sensible man could vote in any way except in favor of a liberal treatment toward the utility. The occasion also offers opportunity for publicity by car cards and in other ways.

The Possibilities of the Trackless Trolley

The Author Presents a Digest of the Development of the Trolley Bus and Gives Suggestions as to the Field Which Is Open to It

BY H. L. ANDREWS
Railway and Traction Engineering Department, General Electric Company, Schenectady, N. Y.



DESIGN FOR A 10,000-LB. TROLLEY BUS FOR THIRTY-FOUR SEATED PASSENGERS

IN EUROPEAN countries trackless trolleys have been successfully operated for many years. In England today there are twenty companies with more than 100 miles of trackless trolley installations operating or authorized, while Italy has eight companies comprising a total of 43½ miles of route, and Germany has eight installations for passenger and freight traffic. France, Sweden and Austria have a number of installations which have given satisfaction.

In view of the present high cost of electric railway construction and of the competition with the motor bus, it is desirable that consideration be given to the trackless trolley in connection with proposed extensions of railway lines and the furnishing of transportation to communities not now served by street railways. The trackless trolley is promising in its small required initial expenditure, as compared with the electric railway, and in the reasonable operating expenses.

In comparing the operation of the trolley bus with the gasoline-operated bus, it would seem that such items as maintenance of way, transportation, traffic, general and miscellaneous accounts would not differ greatly as between the two. However, by substituting an electric motor for the gasoline engine, collecting the current from overhead wires, a great reduction should be made in maintenance, power and depreciation. The first cost of the installation would be very little greater than if gasoline-propelled buses were used.

EUROPE HAS HAD CONSIDERABLE TROLLEY BUS EXPERIENCE

There are in use in Europe three general systems, the Mercedes Stoll, the Filovia and the Max Schiemann. These differ in the method of drive employed and in the plan used for collecting current. A few details of each will be given.

The Mercedes Stoll system is essentially a four-wheel drive, although two-wheel drive installations have been made. The driving motor is built into and is a part of the driving wheel, the armature being keyed to and mounted on the driving axle. The total weight of the motor chassis, which is constructed of pressed steel, is approximately 3,000 lb. The weight of four wheels with motors and tires is approximately 2,450 lb.

The control is arranged to give six speeds and three electric brake positions. When used with two-wheel drive the motors are connected in series for the first three points and in parallel for the last three. The arrangement for the four-wheel drive differs from that for the two-wheel drive only in having the two front wheel or the two back wheel motors connected in series.

The collector used with this system is of the overrunning or carriage type. The current collector at the trolley end is composed of a frame having two small grooved wheels with ball bearings on each side, one for running on each wire. A cable with a double wire hangs from the center of this frame or trolley and has a weighted pendulum, which keeps the wheels well pressed down on the wires. This collector allows considerable movement from the trolley wire and extreme movement is taken care of by means of a cable and reel on the car which allows 25 or 30 ft. radius from the center of the trolley. When vehicles operating in opposite directions meet, the drivers exchange collectors and plugs, which are readily detachable and within easy reach.

This system of collection of current has proved successful, but has the disadvantage of requiring special overhead construction. In case the carriage leaves the trolley wire and falls to the street it is considerably damaged.

The arrangement of motor mounting requires the use of low-speed machines with low efficiency and considerable weight. The maintenance of the motors is more costly than it would be if they were spring supported, because they receive all of the hammer blows from the road.

A number of the Mercedes Stoll installations were made in Austria between 1907 and 1909, using buses weighing about 6,000 lb. without load and having a seating capacity of twenty-five. In some few installations larger cars weighing more than 11,000 lb. complete were used. One installation was equipped to handle motor and trail cars, the motors seating twenty-two and the trail cars twenty.

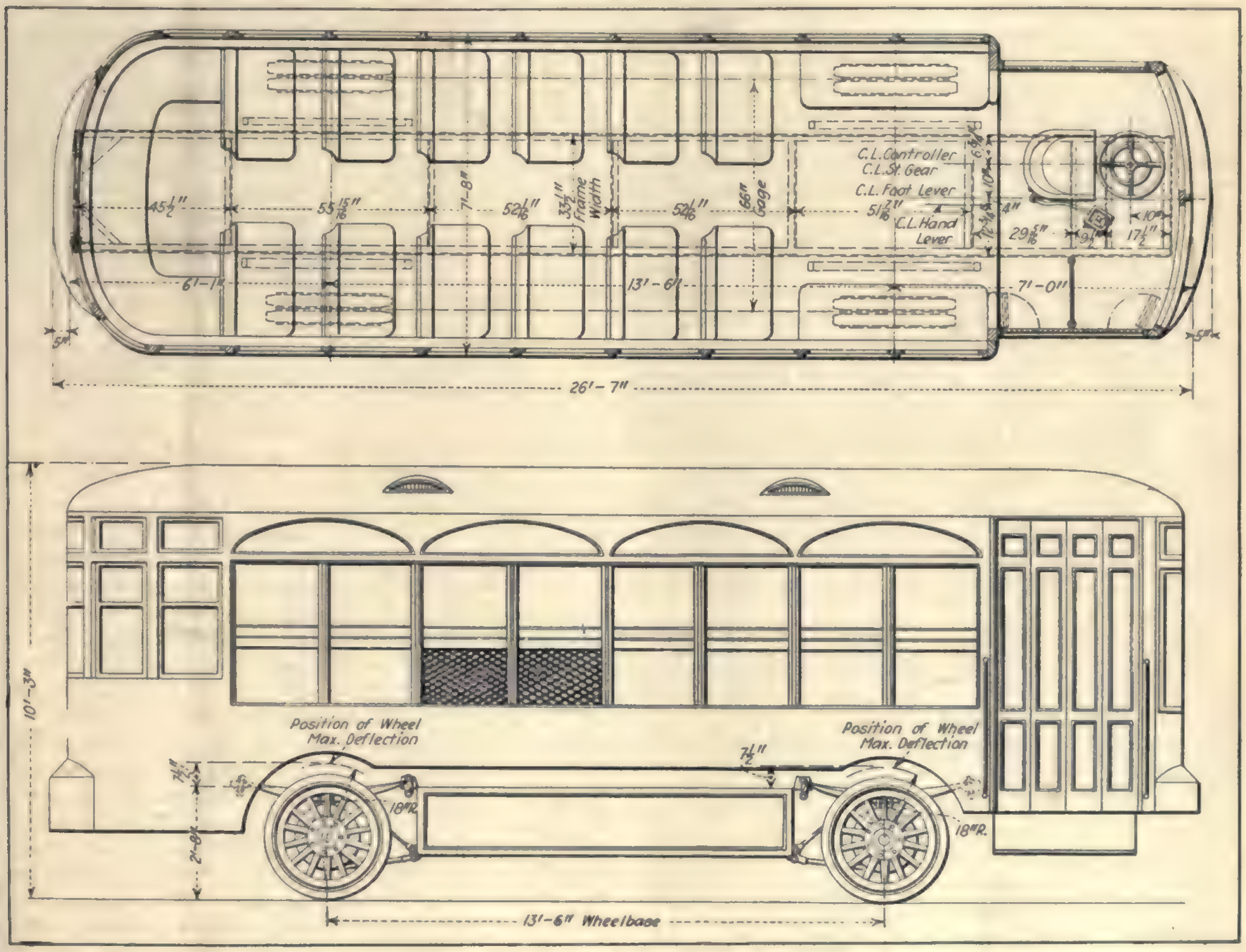
The Filovia system, which is in operation on more than 40 miles of route belonging to eight different companies, has proved very successful. This system adheres to a two-motor drive, each motor being mounted on the chassis and geared to a back shaft on which a sprocket wheel is mounted. Transmission of power to the rear wheels is by means of chain drive. Each car is equipped with two 12-hp. motors. The collectors used are similar to those described above, except that they are carried on a rigid pole mounted on the bus.

The Max Schiemann system has been employed extensively in Germany for both passenger and freight service. There are eight or more installations, three of which are for passenger service only, four for freight traffic only, and one handles both passenger and freight traffic. This system uses a two-motor drive, each motor being mounted on the truck chassis and geared to a back shaft by means of bevel gears. Power is transmitted to the rear wheels by a chain drive.

Three methods of collecting current are used with this system, namely, two trolley poles under-running on the trolley wire, one trolley pole with a double head carrying two trolley wheels, and an over-running carriage as already described.

TRACKLESS TROLLEY PRACTICE IN ENGLAND

The application of the trolley bus in Great Britain has followed somewhat different lines from any of the three systems described. In that country two motors are used, each mounted on the truck chassis and connected to a jackshaft through worm gearing. The jackshaft carries a sprocket wheel and power is transmitted to the driving wheels by means of a chain drive. The controllers are arranged to give nine points with five running positions.



SEATING PLAN OF BUS AND ELEVATION OF PROPOSED TROLLEY BUS PICTURED IN FIG. 1.

In the more recent installations two motors are mounted directly on the chassis, but the jackshaft and chain gearing are omitted, the motors being directly connected to the driving axle, through worm gearing, each motor driving one of the rear wheels. It is of interest to note that this is also the arrangement used on the trolley buses in Shanghai, China.*

Table III shows some general operating data for tramways and trackless trolleys operated under the same respective managements. While these data are not in terms of present-day costs, they are of value for comparison of the two transportation systems.

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*See issue of ELECTRIC RAILWAY JOURNAL for July 10, 1920, page 76.

MAINTENANCE OF TRACKLESS TROLLEY EQUIPMENT

In making estimates of the cost of maintaining the trolley bus under conditions existing in the United States, the experience which has been had with the gasoline-propelled bus and the electric vehicle, depending upon the storage battery as the source of motive power, should be of assistance.

First, as to the matter of tires. The maintenance of equipment, including tire cost and renewals, for the gasoline bus averages about 9½ cents per bus-mile. There are many variable results covering the cost of tires, a great deal depending upon the types of roads on which the bus is operated and also whether solid or pneumatic tires are used. The larger motor bus companies equip their buses with solid tires on all wheels, while others operate solid tires on driving wheels and pneumatic on the front wheels. Solid tires are preferred, as the liability to delays from punctures and blowouts is eliminated.

TABLE I—TIRE COSTS FOR ELECTRIC VEHICLES

Capacity	Road Conditions	Tire	Cents per Bus-Mile
4,000 lb.	Good	Solid	2.62
6,000 lb.	Good	Solid	7.35
7,000 lb.	Excellent	Solid	2.9
10,000 lb.	Very Good	Solid	7.8

One of the largest gasoline-bus companies, operating under excellent road conditions, uses solid tires throughout and obtains the low cost of 0.95 cent per bus-mile for tire renewals. Another large company, using solid tires, operating under less favorable road conditions, spends 2 cents per bus-mile. When pneumatic tires are used on all four wheels the average may be taken at 7.85 cents.

Data from electric delivery wagons of various capacities operating under different road conditions show tire costs as given in Table I. Corresponding tire costs for gasoline-propelled vehicles of the same rated capacities and similar road conditions may be taken as given in Table II.

Road rather than load conditions influence the cost of tires to a large extent. From information obtained from several sources, general averages for tire renewals under various road conditions will vary from 7.6 cents to 8.9 cents per bus-mile for poor roads to 1 cent to 2.6 cents per bus-mile for excellent roads.

TABLE II—TIRE COSTS FOR GASOLINE BUSES

Capacity	Road Conditions	Tire	Cents per Bus-Mile
4,000 lb.	Good	Solid	3.2
6,000 lb.	Excellent	Solid	4.1
7,000 lb.	Good	Solid	3.3
10,000 lb.	Very Good	Solid	7.92
13,000 lb.	Excellent	Solid	5.72

Trackless trolleys would require reasonably good roads, and the tire costs under good or excellent road conditions would vary from 1 cent to 3.4 cents per bus-mile, depending upon the type of road service. As a general average over a good brick, macadam or asphalt road a conservative figure would be about 2.5 cents per bus-mile.

The equipment maintenance on the controller, motors, chassis and body should be materially less than for corresponding items on a gasoline bus. A conservative figure for this item would be 1.5 cents per bus-mile, making the total maintenance for the trackless trolley, including tires, 4 cents per bus-mile.

TABLE III—COMPARATIVE DATA FOR BRITISH TROLLEY CAR AND TROLLEY BUS OPERATION

	Rotherham Corporation		Ramsbottom Urban District Council		Keighley Corporation		Stockport Corporation		Bradford Corporation		Dundee Corporation		Leeds Corporation		Aberdare Urban District	
	Tramways	Trackless Trolley		Trackless Trolley	Tramways	Trackless Trolley	Tramways	Trackless Trolley	Tramways	Trackless Trolley	Tramways	Trackless Trolley	Tramways	Trackless Trolley	Tramways	Trackless Trolley
Miles of route operated	11.22	4.61	Tramways Not in Operation	3.3	3.44	1.8	14.62	1.7	62.59	1.26	16.94	1.26	62.05	3.66	2.78	2.98
Number of cars	37	6		4	12	1	50	3	245	3	56	2	315	4	10	8
Number of car-miles per annum	852,639	128,685		43,412	241,917	17,114	1,490,116	44,856	6,206,239	49,639	1,347,614	40,366	9,192,265	75,066	121,443	10,918
Car-miles per car	23,044	21,447		10,853	20,143	17,114	29,802	14,951	25,331	16,546	20,419	20,163	29,181	18,766	12,144	1,385
Car-miles per mile of route	75,980	27,914		13,155	70,034	9,508	101,923	26,386	11,985,237	56,042	79,552	32,012	168,262	20,509	43,677	3,639
Energy consumption kilowatt-hrs.	1,731,184	120,303		52,058	263,763	10,952	966,094	53,653	99,289	41,024	2,483,270	37,200	18,605,532	66,466	156,248	11,058
Kilowatt-hours per car-mile	2.03	0.97		1.19	1.09	0.64	0.66	1.19	1.93	1.13	1.84	0.92	2.02	0.88	1.28	1.01
Number of passengers per annum	9,874,231	471,690		162,955	3,606,216	98,264	12,375,755	212,618	67,258,805	416,361	18,889,425	152,919	98,319,648	360,126	1,031,147	85,208
Passengers per car-mile	11.6	3.7		3.75	10.7	5.7	8.3	4.9	10.6	8.4	14.02	3.79	10.7	4.8	8.5	7.8

SOME OTHER FINANCIAL FACTORS

One of the most promising features of the trackless trolley is the moderate cost of power for operation. A trolley bus seating twenty-five persons, mounted on a modern chassis, using a car body following railway practice with transverse seats, would weigh approximately 8,000 lb. Under good road conditions it would require approximately 1.2 kw.-hr. per bus-mile, or at 1.75 cents per kilowatt-hour, the energy cost would be 2.1 cents per bus-mile.

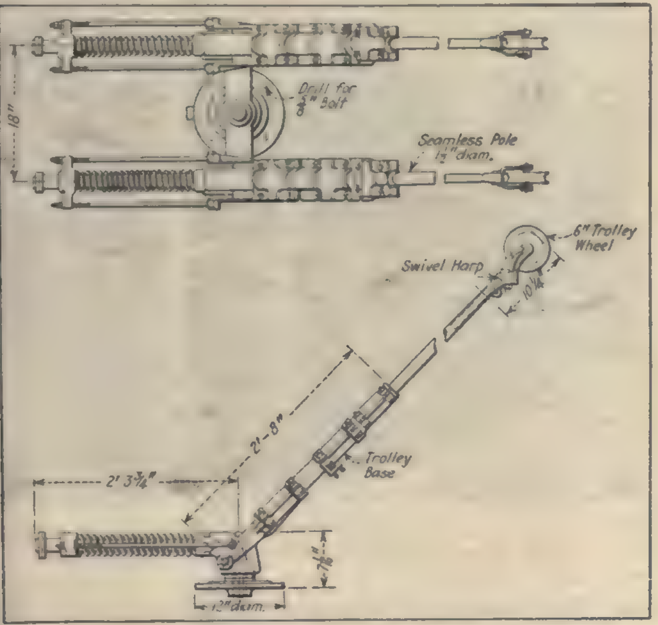
As to depreciation, a trackless trolley equipped with motors and control, following railway practice, should have a life approximating that of a street car. With lightweight construction a conservative estimate would be a useful life of ten years, equivalent to a depreciation of 8 per cent. Assuming a first cost of $7,000, the depreciation would be 1.9 cents per bus-mile, based on, say, 37,500 miles per year.

In the matter of capital cost, the investment in a trolley bus would be about the same as that in a gasoline-driven bus, about $7,000 for a two-wheel drive bus seating twenty-four to twenty-six persons. The cost of repair shops for the two types of vehicle would not vary greatly. One advantage of the trolley bus is that it can be stored in the open with no harmful results so far as the operation is concerned, as it contains nothing that can freeze in the winter.

The trolley bus system requires overhead construction, which will cost approximately $9,000 per mile, assuming one line to be used for each direction of traffic and cross-span construction poles to be employed. The cost would be $7,000 if only one line were used, but in this case it would be necessary for buses to draw to one side and stop while passing each other.

To illustrate the cost of installing and operating the trackless trolley systems with assumed conditions, the following calculations will be of interest:

Consider that an extension of 2 miles is to be made, that ten-minute service is required and that a trolley line will be installed for each direction of traffic. A schedule of 8.5 m.p.h. could be made, requiring from twenty-eight to thirty minutes for a round trip. Three buses would be needed for this schedule, but four would be purchased to provide a spare. The buses would then cost $28,000 and the overhead, 2 miles at $9,000 per mile, $18,000, a total of $46,000.



TWO-POLE CONTACT DEVICE FOR USE ON TROLLEY BUS

Further, assume sixteen hours of service per day, 365 days per year, calling for 50,000 miles of annual operation for each bus, or an average for the four buses of 37,500 miles. Assume fixed charges less depreciation at 10 per cent, or $4,600. This is 1.23 cents per bus-mile.

Under these assumed conditions the operating cost would be 8 cents per mile for maintenance, power and depreciation, and 1.23 cents for fixed charges less depreciation, a total of 9.23 cents per mile.

The type of trackless trolley recommended for operation would have a seating capacity of from twenty-four to twenty-six persons, with transverse seats, front entrance and exit, arranged for one-man operation.

The standard automobile truck chassis could be used, substituting electric motors for the gasoline engine, mounting the motors directly on the truck chassis and connecting to the driving axle through worm gearing and a differential drive. Instead of this a four-wheel or a two-wheel drive could be used, utilizing a direct motor drive similar to the Mercedes Stoll system, except that the motors would be connected to the driving wheel through planetary gearing and internal gearing on the wheel hub. This system has been in general use on storage battery trucks for a number of years and has proved successful. For operation where no severe winter or grade conditions are to be met the two-wheel drive is all that is required. For the northern sections, where snow conditions and grade conditions are more severe, it may be advisable to use the four-wheel drive.

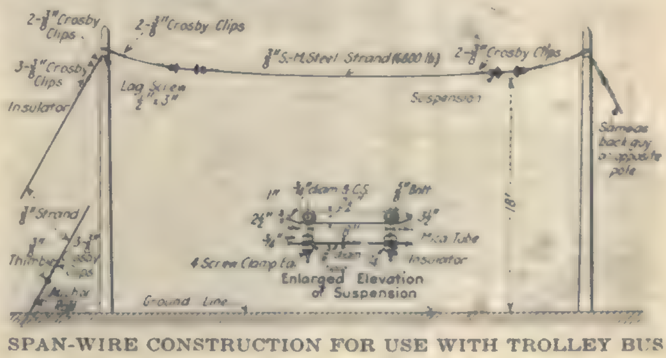
A four-wheel drive bus seating thirty-four passengers is illustrated on page 1136. It has a seating arrangement, floor plan and elevation as shown on page 1137. It weighs approximately 10,000 lb. fully equipped and costs about $10,000. A similar bus seating twenty-four persons could be handled with a two-motor drive and would weigh not more than 8,000 lb. and cost $7,000. This type of bus follows railway design and is arranged for one-man operation. If a body similar to that used on most gasoline-propelled buses was submitted for the one shown the weight and first cost would be materially reduced.

TRAMWAY PRACTICE HAS DEVELOPED MOST OF THE REQUIRED DETAIL PARTS

The bus shown on page 1136 is equipped with an under-running current collector controlled from the driver's seat, with sliding shoe contact. With this type of pole it is unnecessary for the driver to leave his seat in removing the pole from the wire for a passing bus. By means of an indicator and a mirror, the operator is able to replace his collector.

Another type of collector similar to that used much in Europe is shown herewith. This consists of two insulated trolley poles mounted on the same base, each carrying a swivel loop and standard trolley wheel. Where two trolley lines are used, one for each direction of traffic, and loops are provided at the end, this type of collector should give excellent results. It has the advantage of allowing standard trolley overhead construction and can be constructed to provide a sufficient lateral movement to permit the vehicles to pass without excessive side pressure on the trolley wires. It also has the advantage of permitting running over the same route as the street railway without the installation of additional wires, by locking down the negative trolley pole, using a trailing shoe to run in the groove on the rail.

On the trackless trolley bus controllers and motors should follow standard railway practice. Overhead construction should be as nearly standard as possible. The use of vehicles equipped with electric motors drawing power from overhead trolley wires is not limited to passenger transportation. There are in this country many established truck lines handling definite loads between definite points and operating over established routes. Many of these could be economically operated by the same method as that described for passenger buses.


2-$\frac{3}{8}$" Crosby Clips
2-$\frac{3}{8}$" Crosby Clips
3-$\frac{3}{8}$" Crosby Clips
Insulator
Lag Screw $\frac{1}{2}$" x 3"
$\frac{3}{8}$" S-M Steel Strand (6800 lb)
2-$\frac{3}{8}$" Crosby Clips
Suspension
Same as back guy on opposite pole
18'
$\frac{3}{8}$" Strand
Thimble
Anchor
Ground Line
$\frac{5}{8}$" Bolt
Mica Tube
Insulator
4 Screw Clamp Ear
Enlarged Elevation of Suspension

SPAN-WIRE CONSTRUCTION FOR USE WITH TROLLEY BUS

A suitable trolley line could be installed between the city limits of any definite haul and storage batteries could be used to obtain a cruising radius in each city to enable the truck to pick up and deliver its load. This battery could be carried over the entire haul, and charged direct from the trolley, or storage battery stations could be established at the end of the trolley section and the batteries installed and removed at this point. For short hauls from the main lines of travel a storage battery could be employed or an overhead collector and cable reel.

A number of trucks operating over the same route under different ownerships could use the same overhead structure, the energy used by each truck being metered and arrangements made for paying for the storage battery on a mileage basis. The type of drive on these trucks could be made to suit operating conditions as in the case of the passenger buses. This method of handling freight has been in successful operation in Germany for years.

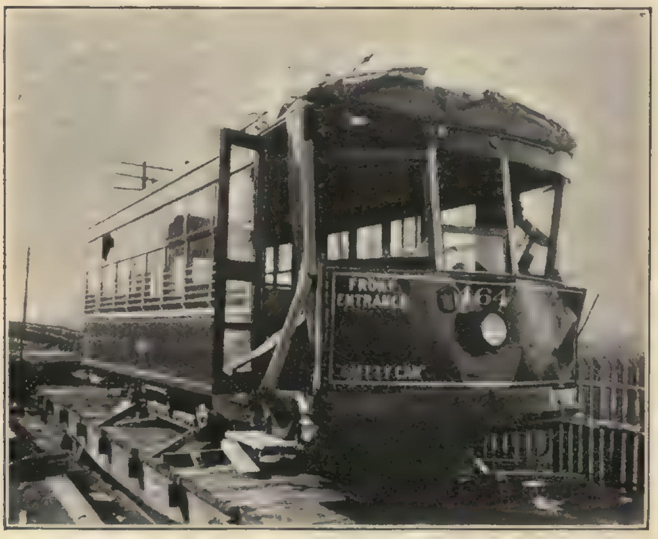
Rebuilding a Safety Car

Damaged Car Is Rebuilt by Using Parts Stripped from the Original Car for Fabrication Wherever It Is Possible

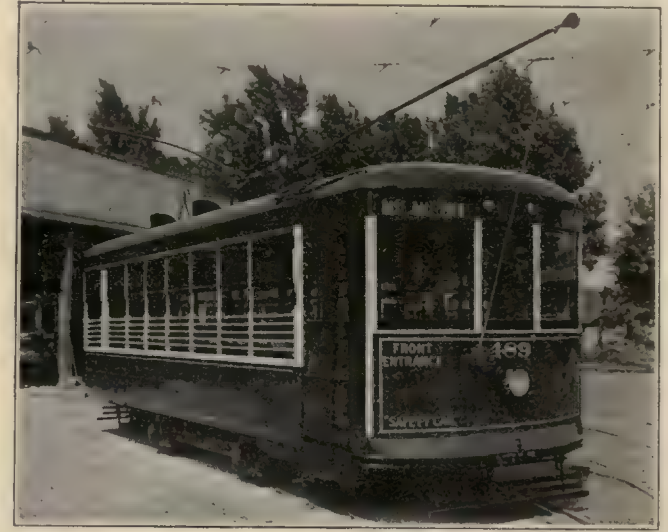
By E. M. Walker
General Manager Terre Haute, Indianapolis & Eastern Traction Company

MUCH has been said and written about the structure of the safety car and its light weight and arguments have been made, pro and con, as to its durability. An interesting commentary on this question is furnished by the case of the car illustrated in the accompanying photographs. The car was originally built by the American Car Company of St. Louis as car No. 464 and was shipped to Terre Haute, Ind., along with a half dozen other cars, as the first shipment of safety cars to come to Terre Haute during the latter half of November, 1918.

All the cars came through safely with the exception of this one, which, being located in a freight train between two box cars, was jammed in a collision en route. So badly was the car damaged that the transportation company immediately returned it to the builder and provided for a new car to take its place. In building the new car, which was also numbered 464, everything was stripped from the wrecked car which could possibly be used in the fabrication of a new car, including truck, motors, safety devices, seats, etc. After the car was so stripped, the body was obtained from the car builder and shipped to Terre Haute, where it was rebuilt in the Terre Haute division shops of the Terre Haute, Indianapolis & Eastern Traction Company. The missing parts to make a complete car were supplied by purchase.



SAFETY CAR AFTER EXPERIENCING A DECIDED SHAKE-UP EN ROUTE TO TERRE HAUTE



THE SAME CAR AS SHOWN IN THE PRECEDING ILLUSTRATION, BUT REVAMPED AND RENUMBERED

Deliveries of the supplies needed were necessarily very slow during the spring and summer of 1919, and consequently the car was treated as a sort of odd job, to be worked on when there was plenty of available time, so that it was not completed and ready for service until Nov. 24, 1919, practically a year after the day on which it was wrecked. It came out of the shops as car No. 489, which is illustrated. The complete cost of building car No. 489 was approximately $4,500, of which $750 was for labor.

The car was placed in service on Nov. 24, 1919, and continued in regular service until the first of June, 1920, during which time it had operated 21,293 car-miles. At this time it was scheduled to go through the paint shop for a general overhauling, inspection and repainting, which was done about the middle of June, at a shop expense of $10.47, and paint shop expense, including labor and material, of $29.02, or a total of $39.49. The car was replaced in service in June, 1920, at about the middle of the month, and has been in regular, continuous service ever since.

The photograph of car No. 489 was taken on the day the car re-entered regular service. The other photograph, of the exterior of car No. 464, was taken by the builder of the car in St. Louis, about the first of December, 1918.

Of interest in connection with the electrification of the railroad which is under way in France is a bulletin issued by the French commission in New York City regarding the development of water powers in that country. The total available power is estimated at 9,000,000 hp., of which 1,165,000 hp. is in use. About 500,000 hp. additional is being equipped. In about fifteen years 6,000,000 hp. more should be realized. When the fifteen-year program has been carried out it is estimated that France will be third among the nations in water-power development.

Public Officials on Service at Cost

Four Addresses at Session of National Municipal League in Indianapolis Devoted to Service at Cost for Electric Railways—Views of the Operation of These Franchises Are Given from the Standpoint of the Authorities

A SPECIAL session of the annual meeting of the National Municipal League, held in Indianapolis, Nov. 17-19, was devoted to the discussion of the topic "Service at Cost for Street Railways—Panacea or Nostrum." W. F. Hodges, Mayor of Gary, Ind., presided at the session and abstracts follow of the papers presented. The titles given are those under which they were scheduled in the official program.

"Service at Cost in Boston," by James F. Jackson, Chairman Board of Trustees, Boston Elevated Railway

THE first speaker at the meeting in Indianapolis was James F. Jackson, chairman board of trustees, Boston Elevated Railway. He first described how the Boston Elevated Railway came under State control on July 1, 1918, the State agreeing to pay a rental of 5 per cent for the first two years, 5½ per cent for the next two years, and 6 per cent for the remaining six years of the term. According to the speaker, three factors in the transportation situation in Boston had influence in bringing about this decision. The first was that the usefulness of the street railway had come to be fully understood. The public appreciated as never before that the street car is not alone a poor man's carriage but that of the public official, the professional man, the man of business; that it was directly or indirectly the carriage on which every one relies and that no jitney or other kind of omnibus could be substituted. It must be preserved. The second factor was that the railway in Boston represented an honest investment under a public supervision that had prevented excessive issue of stock or bonds and that there was no call for reorganization to eliminate watered stock. The third was that the new capital which was indispensable to sustain this service must be obtained by buying it at market prices as other necessities are bought; in other words, that investment must have its secure return.

To the legislative mind the problem for experience to solve was whether or not a public management could be efficient, that is to say, conducted without waste and without loss of ambition or pride in achievement. It was thought that a trial was worth while. The basic plan for this experiment was that which the speaker believed is the best for any street railway enterprise—a service at cost—meaning, of course, proper or necessary costs.

The speaker then reviewed the financial situation of the company following the increases in fare, a situation which has recently been reviewed in the financial columns of this paper. He spoke of the deficit which occurred in July, August and September of this year, but said that it was expected and that unless some extraordinary event intervenes this deficit will be readily absorbed before next July, leaving at the close of the fiscal year, as at that of last year, no deficit. Mr. Jackson then explained that there have been two principal causes for increased expenses. One is the increase in labor and the other that of coal. The company also charged off to depreciation last year about $2,000,000. Proper charges to depreciation, the speaker said, are not made to build up the properties at a full measure of the original investment for the benefit of stockholders, but to maintain it in good operating condition for the benefit of the public. This means that the old-fashioned notion of maintaining a railway by hand-to-mouth methods with large expenditures in prosperous years and small expenditures or none at all in lean years is a thing of the past. Sound policy today takes care that out of every day's receipts something is put aside to meet the wear and tear that is constantly taking place in the property.

Mr. Jackson then touched on the question of flat fare vs. zone system, saying that the former was still used in Boston, but that there are advocates there of zone fares, and the trustees are studying the comparative merits of the two systems in the light of experience in this and other countries. He also spoke of experiments with short route cars on which a 5-cent fare is charged and said that while some of these experiments had proved failures, two of the lines are now in successful operation. He also referred to the large expenditure for subways whose annual rentals now amount to nearly $2,000,000, or ½ cent upon each ride.

HOW THE BOARD WAS ORGANIZED

When the trustees assumed office in 1918 they worked out a general plan of improvement involving a total outlay during a period of five years of about $18,000,000, chargeable in about equal proportion to capital and replacement. The board acts in a way very similar to a board of directors with committess of two assigned to administrative departments to report from their several spheres of activity at stated or special meetings of the board. The operating staff has at its head a general manager, Edward Dana, and the confidence reposed in him has been amply justified in what he has accomplished. His ability, energy and untiring devotion to the work and his harmonious relations with the trustees and subordinate officials and employees have proved invaluable. In conclusion the speaker said:

"I have long been acquainted with the men who have had charge of the railways in Massachusetts and in New England. They have been men who are held in the highest esteem in the communities where they live. Through the stress of all these years they have kept at their posts undismayed. The record is one of ability, loyalty to public interests and unblemished honor. Nor are they unlike the men who have managed street railways elsewhere.

"Under the conditions which prevail today we may all of us feel a new zeal, a new confidence in the success of the work at which they have labored so long. My last word, then, is one of optimism. But the struggle is not over. Fares are not yet adjusted. There is the fight against the jitney and the contest with the private automobile; the search for new economies to meet higher cost of operation; the effort to restore credit and inspire new confidence in capital. So it is an up-grade and a long pull that lies ahead; but the street car is bound to win."

"Service at Cost and Efficient Management," by Hon. Fielder Saunders, Street Railroad Commissioner, Cleveland, Ohio

IN THE opening part of his address Mr. Saunders said that while the Cleveland franchise possibly has not proved a panacea for the ills of railway service, it has certainly not proved a "nostrum." He then sketched the history of the adoption of the Cleveland franchise and quoted its preamble, which included among its objects "that the rate of fare may be reduced" and that "the best street railway transportation might be secured at cost, consistent with the security of the property and the certainty of a fixed return thereon, and no more." In the speaker's opinion the franchise has resulted in a great civic benefit and this is also the conclusion reached after long study conducted during the first half of this year by a board of arbitrators appointed to consider the question of return to the company. This board was made up of the city commissioner of light and heat, the president of one of the largest banks in Cleveland and the federal judge of the district. This board said in part: "The franchise and the amendments thereto have been shown by ten years of trial to be sound in principle, practical in operation, and of great benefit to the Cleveland Railway Company and its stockholders and to the public" and "have resulted in giving to Cleveland the best street railway service at the lowest cost of any city in the United States."

Mr. Saunders said that while it is true that the fare has almost doubled, every other commodity has practically doubled its price in the last ten years, and he pointed out that the wages of the trainmen had increased from 26 cents to 75 cents per hour or in even greater ratio. In the meantime the rolling stock has been increased from a seating capacity of 36,100 in 1910 to one of 74,800 in 1920. The total standing capacity has been increased from 44,000 in 1910 to 80,460 in 1920. The miles of track have increased from 246 to 303, many modern carhouses and substations have been built, and shops have been erected at the cost of $1,300,000.

Another way, Mr. Saunders said, of determining whether a contract has carried out its purpose is to consider the attitude to it of the contracting parties. The Cleveland franchise has been criticised at various times because of the so-called lack of incentive in it. Nevertheless, the people of Cleveland are satisfied. Thus, when the first period of the grant expired on May 1, 1909, it was necessary before that time for the city government to renew the franchise for a period of twenty-five years or permit the property to continue in the hands of the company without city control of the service, or to exercise its option to buy it and put in force municipal ownership. A series of meetings was held by a committee of the Council having the decision to make and the matter was widely advertised in the newspapers. Nevertheless, all the amendments suggested as being desirable came from the city street railroad commissioner. No public sentiment was manifested for municipal ownership nor for any particular change in the grant, except on the part of a few councilmen and a few public officials who had been in very close relationship with the railway company and its day-to-day operation. No amendment was offered by any civic society of Cleveland, nor by any newspaper nor by the Chamber of Commerce nor by any of the various clubs interested in public matters. The railway company refused to accept the amendments suggested and said that it was satisfied with the franchise as it stood. It immediately became evident that the public also was satisfied with the franchise, and the City Council renewed the agreement in identical terms for a further period.

The one serious problem pending at present relates to the return to the stockholders, which is limited in the franchise to 6 per cent. Extensions to the property have always been financed by the sale of new stock, but for more than a year it has been impossible to sell Cleveland Railway 6 per cent stock at par in Cleveland, and the franchise forbids the stock being sold for less than par. Although extensions are needed, the people evidently thought the proposed change to 7 per cent too far-reaching and failed to approve it at a popular vote, so that at present, so far as this is concerned, matters are standing still, but the speaker said he had no doubt the problem would be worked out satisfactorily in a mutual spirit of co-operation, as have so many of the previous difficulties.

The speaker said that most of the criticism of the service-at-cost plan as developed in Cleveland in the last ten years was as to the lack of incentive, but he pointed out that this is really directed at some of the conditions in the franchise and not at the working out of the franchise as shown in operation. The speaker then explained at length why these conditions had not proved objectionable in Cleveland.

THE INCENTIVES IN THE CLEVELAND FRANCHISE

In the first place he pointed out that the Cleveland Railway is not under absentee ownership. The management is largely represented among the stockholders, and some of the present success is undoubtedly due to that fact. The management also has the benefit of daily counsel and criticism of the city commissioner; not monthly or annually as is granted by public service commissions; nor has the criticism been selfish, partisan, or political. It is true that during the past two years it has become the practice to write into service-at-cost franchises a so-called incentive by which the stockholders of the company may get additional and varying returns under certain circumstances, as in the Cincinnati sliding scale, the Montreal budget system, and the new Rochester franchise. The speaker said he had no particular quarrel with such provisions at this time, but personally he had serious doubt whether in practical operation any of these ideas will produce any tangible lasting good, and he wanted to wait the test of experience.

When the present franchise was being considered in March, 1909, by Mayor T. L. Johnson and President Horace E. Andrews with various councilmen, one suggested a sliding scale of interest, so that the return to the company would increase with decreases in the fare, on the ground that it would be an incentive to the stockholders to make the fare as low as possible. Mayor Johnson replied that it would also be quite as much an incentive to skimp the service, and Judge Tayler ruled that a fixed return would be better. On this point Judge Tayler expressed his belief that it was fundamentally wrong to pay a man a bonus for doing that for which his salary is supposed to compensate him, that a bonus could not be a legitimate part of the cost and that therefore such an arrangement would mean service at more than cost, and that the people were entitled for the salary they paid to the officers of the railway to intelligent and efficient management and that they ought not to be taxed any more.

Mr. Saunders said that he agreed with this statement of Judge Tayler and added that the bonus idea is not only fundamentally wrong but that practically it would not work because it would create an incentive on the part of the railway company to keep down its expenses by skimping the service. Under the present service-at-cost plan, the company has no desire to do this. Within the limits of its power to earn 6 per cent, it makes no difference to the company how much or how little service is run. But any temptation of an added dividend would create a tendency on the part of a company operating under such a franchise to encroach on the city's prerogative as to service and to render a cheaper and more unsatisfactory service even though ostensibly complying with the city's order.

There would also be an incentive for the management not to keep the property up, because the lower the maintenance charges the lower the rate of fare and the higher the returns of the stockholders. There would also be an incentive to keep down the maintenance by increasing the capitalization by charging repairs and replacements to capital.

Again, some financial experts maintain that there is a connection between current interest rate and the price of commodities, that they rise and fall together. If this is the case, Mr. Saunders said, as the cost of labor and materials used in railways go down, the return on the money invested should not go up, but under the present "incentive" service-at-cost franchises the return to the stockholder will go up as the fare goes down, instead of going down as it should if the rule just mentioned is correct. Moreover, such an arrangement is likely to be a bad one from the public standpoint, if we have reached the peak of high prices, because under the sliding scale, as prices go down the returns would go up. But even if all of these conclusions are wrong, any scheme of incentive so far suggested is open to the criticism of lack of effectiveness because of the remoteness from and lack of direct application to the actual executives. From the speaker's knowledge of what had happened in the last five years he believes that, after all, the real incentive to efficient management is to give the man at the wheel, the man who actually operates, sufficient compensation to keep his best interest in his work and then to have an efficient city administration to act as the watchdog, to criticise, advise and sit on his neck day by day as is done in Cleveland to see that he earns his salary.

"Indianapolis and the 5-Cent Fare," by Hon. E. T. Lewis, Chairman Public Service Commission of Indiana

IN THE opening part of his address Mr. Lewis said that the day is past when financial distress of the street railway industry can be looked on as of concern only to the industry. He then sketched the recent history of the local railway in Indianapolis, which, while asking for temporary relief—a transfer charge and readjustment of payments by interurban companies for trackage and terminal facilities to tide the company over the coal crisis—has indicated no desire for a higher basic fare than 5 cents. This is because the company believes that a higher basic fare than 5 cents, at least in Indianapolis, would cut down the most profitable part of its business, *i.e.*, the short-haul patronage.

In 1918, on a decision of the Supreme Court of Indiana, the Public Service Commission assumed jurisdiction over the property and eliminated fares of less than 5 cents. In December, 1918, the company applied for a 6-cent fare, but this increase was denied, largely as the result of four changes which improved the financial condition of the company. One of these was the introduction of prepayment cars; the second was the simplification of the corporate organization company by which a holding and operating company, the Indianapolis Traction & Terminal Company, was eliminated, reducing the securities approximately 30 per cent; the third was a change in the sinking fund provision, and the fourth was a renewal of the local industrial activity following the war. In 1918 the Indianapolis street cars transported 70,003,795 revenue passengers; in 1919 the traffic jumped to 84,061,850 passengers; in 1920 it will probably pass the 94,000,000 mark.

The speaker pointed out that there are a number of favorable conditions for economical electric railway operation in Indianapolis. These advantages are geographical and social. Thus, the company mines a large amount of its own coal in fields located near Indianapolis, and this means cheaper fuel cost than that faced by most companies. Wages and cost of living all through the war period have been at somewhat lower levels in Indianapolis than those prevailing in the zone of greatest war activities and excesses, which reached back from the Atlantic Seaboard through Buffalo, Pittsburgh, Youngstown, Cleveland and Detroit to Chicago. The speaker also said he wished specifically to disavow any intention of saying that a continuation of the 5-cent fare would have been possible for all companies and cities. Indeed, the Indiana commission had considered it to be its duty to put higher than a 5-cent base fare into six Indiana cities. He did believe, however, that many cities had not thoroughly tried out the possibilities of the 5-cent fare. Nationally, it appears that the peak has been reached in operating costs and that the break is near, although the skies are not clear.

The aftermath of a war also is generally marked by heavy increases in local taxation. Thus, one of the reasons for the inauguration of the 6-cent fare in Cleveland was a $150,000 increase in local taxation falling upon the company. In Indianapolis, he said, at just the time that favorable operating sheets were expected, the same burden fell. Direct taxation, franchise tax and paving costs in Indianapolis, during the coming year, will call for almost 1 cent of the fare paid by street car riders in that city. In the speaker's opinion the financial obligations of utilities which represent real values must be protected.

ADVERSE VIEW OF SERVICE AT COST

The latter part of the address was devoted to a discussion of service-at-cost franchises. Such a franchise was proposed for Indianapolis in April of this year. It was designed to strengthen the credit of the local company and was proposed by the corporation counsel for the city and had received the approval, with possible minor changes, of the attorney of the company. A sliding scale of return was proposed by which efficiency was to be rewarded by maximum returns and inefficient operation was to be penalized. It was decided to make a direct study of the operation of service-at-cost franchises in near-by cities, and a committee of three, consisting of the corporation counsel for the city, the attorney for the company and the chairman of the Public Service Commission, undertook to make such an investigation. The conclusions reached as the result of this trip were unfavorable to the plan. The city filed with the commission a motion to withdraw the proposal, the company did not object, and the commission, without a dissenting voice, voted to act in the affirmative on the motion. The city representative, the author of the original proposal, in his motion for withdrawal, said in part:

"We have been unable to find or agree upon any plan of operation on the basis of service at cost which would furnish the incentive of private ownership and operation of service at cost. The results of our investigation generally have been to raise a most serious question and doubt as to the wisdom of the service-at-cost plan. The inevitable tendency seems to be for the operator or company readily to accept increased cost of operation with the view that it can be passed on to the public by higher fares. Such a course results only in adding to the burden of the public."

Mr. Lewis said that the commission does not mean that it dogmatically cast out service at cost from all future considerations, but it is suspicious of the plan in that it seems to run contrary to human nature, which, at least in business, requires opportunities of a struggle for gain. Again, service at cost is closely connected with city halls, which in turn are closely connected with political organizations, and it is very desirable that electric railways should be kept out of politics. Finally, the theory of regulation of public utilities by commissions is service at cost. These regulatory bodies determine rates by making them only sufficient to cover: (1) Operating costs; (2) the replacement of the wear and tear of the plant—depreciation; (3) taxes—but not individual income taxes; (4) a fair and reasonable return upon the fair value of property used and useful in performing the public service. When the rate is based on these foundations, there is service at cost. In closing the speaker pointed out that none of the Indiana street railways is in the hands of receivers, and that only six of the 600 cities having more than a 5-cent fare are in Indiana.

"Service at Cost vs. Municipal Ownership—Seattle's Experiment," by Charles M. Fassett, Formerly Mayor of Spokane, Staff Member of American City Consultants

IN THE opinion of Mr. Fassett, service at cost for electric railways is a transition stage between private ownership and operation and municipal ownership and operation, a temporary expedient, and one which will be in the long run unsatisfactory to both the owners of the railways and the public. To the owners it will be just a tightening of the chain of public regulation which curtails more and more their freedom of operation, but it will be sought by them in order to fix a value which may form a basis for public purchase later. For the public it has certain advantages in giving further control over the utility, it restrains financial skyrocketing, provides for extensions and betterments, recognizes the street railway business as a natural monopoly, gives the public a little authority in the directorate, enforces adequate accounting and retains to at least a small extent the alleged advantage of leaving the business in private management.

In the speaker's opinion the decision between service at cost and municipal ownership in any city must be influenced by local conditions and particularly by the character of the city government. Up to the last ten or fifteen years the structure of city government in this country was not adapted to public ownership, and where the electorate is heedless, officials change frequently and politics is a game of spoils, public ownership is unthinkable as a business undertaking. But a new light is dawning upon American municipal life, Mr. Fassett said, and in his opinion the voters will ultimately awaken to the necessity of a better form of government in which the officials have more authority and responsibility and a more lively interest in government on their own part. When these things have been accomplished the people will insist upon the ownership of their public utilities, their operation on the basis of the greatest good to the greatest number and the banishment from municipal life of those evil forces which have done so much to corrupt city government in America.

THE SITUATION AT SEATTLE

In commenting on the Seattle incursion into municipal ownership, Mr. Fassett said:

"It is too soon to make a reasonable forecast of the outcome of Seattle's latest experiment in municipal ownership. Inadequate financing was forced upon the city by reason of constitutional debt limitation. It must pay for its purchase in eighteen years and at the same time build up a depreciation reserve of more than $12,000,000, thus placing an enormous burden upon its street car patrons in this generation in order to turn over to the citizens of twenty years hence a street railway fully paid for and adequately maintained. It is a feat which no private company would undertake. A service-at-cost franchise would have called only for the payment of operation, depreciation and interest, and unless there is careful management the fares may be higher during this twenty-year period than they might have been under service at cost. Seattle has not an ideal form of government for carrying on the business of utility management, yet its publicly owned water works and electric light and power plant have been efficiently managed, and the high-class men who are at their heads as superintendents have been there many years, through many changing political administrations. The civic spirit in Seattle is high and I believe that public ownership has a better opportunity there than in many cities which have more modern forms of government."

Investment Bankers' Association Bulletin a "Public Utility" Issue

THE bulletin of the Investment Bankers' Association of America for Oct. 29 is largely a "public utility" issue. It contains a copy of the report of the association committee on public service securities presented at the recent Boston meeting, the address at that meeting on present utility problems by Carl D. Jackson, chairman Wisconsin Railroad Commission, and a copy of the resolution on public service securities adopted by the board of governors of the Investment Bankers' Association on Oct. 3. This resolution was published on page 935 of the issue of this paper for Oct. 30.

Norfolk's Traction Situation—I

Report of A. Merritt Taylor and Charles B. Cooke, Jr., Used as Basis of Solution of Street Railway Problem in Virginia City—Value Determined Upon a "Judicial" Basis —Recommendations Made for a Modern Franchise—Service Rehabilitation and Rerouting Also Considered

IT WILL be recalled by the readers of the ELECTRIC RAILWAY JOURNAL that last spring the city of Norfolk, Va., adopted a broad-gage policy toward public utilities and was upheld in this policy by the Corporation Commission of the State. This was concretely shown in the case of the Norfolk Gas Company, a subsidiary of the Virginia Railway & Power Company, as reported in the JOURNAL for March 27, 1920, page 667, and commented upon in the issue of April 3, page 682, and April 10, page 736. The platform upon which the city of Norfolk officially agreed to treat public utilities within her borders was stated as follows:

> Capital legitimately invested in public utility properties must be safeguarded and protected by municipalities, both as to principal and as to a just and inviting return thereon after reimbursement to the company for expenses incurred in providing service.

Following the conclusion of the gas company case, the more complicated street railway question was taken up by the experts employed by the city, A. Merritt Taylor and Charles B. Cooke, Jr., of Philadelphia. Their report on the railway situation was rendered several weeks ago, as already noted in these columns, and the city is now working on a definite franchise agreement based upon the recommendations of this report. On account of the manner in which some of the subjects of the question are considered, the JOURNAL is giving space to a rather extended analysis of the report of Messrs. Taylor and Cooke.

The report states that, as is often the case, it has been found that the financial troubles which underlie acute service deficiencies have proved to be the logical outcome of a long continued failure, on the part of both city and company, to recognize certain fundamental truths and sound business principles in working out their respective natural rights and obligations in the premises. The present report, however, is an attempt to seek a solution of Norfolk's transportation troubles through practical business methods, unhampered by political considerations, and contains some well-conceived and co-ordinated measures for rehabilitating the property, service and finances of a situation which in several respects is typical of many American cities.

It is rather to be expected that in a comprehensive program of the kind sponsored by Norfolk the settlement of detail parts of that program may not, in all cases, represent the most that either company or city might like to have with respect to that particular detail considered alone and apart from other factors and elements. The report states, however, that the purpose has been to deal out even-handed justice to both city and company.

The report is supplemented with many tabulations showing the detail of the development of income accounts, allocated by routes and zones, and with maps showing the trackage and routing systems as found, and revisions of these necessary to produce required betterment of service. The diversity of subjects covered is indicated by the following section headings: Service and facilities, present and required; delivery district; jitney competition; additions and betterments to railway property; value for rate-making purposes; analysis of earnings, expenses and fixed charges; sources of profit and loss from operation; fares and fare policies; franchises.

These headings divide into three classes or subjects for analysis: Franchise policy; valuation, and fares, jitneys, rerouting and other service improvements. In this issue the first of these is considered and the two other subjects will be treated in subsequent issues.

The report deals at length with the subject of franchises; first, from the standpoint of the legal and economic interests which the city, State and service company have severally in the franchise agreement, and second, with respect to the practical application of basic principles so developed, to the revision of the Norfolk franchises.

ANALYSIS OF BASIC PRINCIPLES

In an introductory statement the report states in effect that the type and terms of a franchise may either destroy or effectively assist in establishing and fostering credit of the grantee and that economically unsound franchise rights and limitations may thus actually block efforts to provide that character of service which the community naturally seeks in granting the franchise to fulfill its aspirations in this direction.

Service deficiencies may be expected to continue so long as franchise contracts "drawn in a period when any real conception of the economic status of public service properties was notoriously lacking, are such as to jeopardize the interest of present and prospective investments therein." Such appears to be the case in Norfolk, and any program for solution of the transportation problem in that city must, in order to be adequate and productive of results, include a forward-looking revision of franchises with such provisions removed as are now obsolete and in conflict with the primary purpose.

The elimination of obsolete types of franchise obligations is stated to be just as important as the removal of obsolete physical equipment, and further, that correction of underlying obsolescence in the franchise accelerates correction of obsolescence in the physical property.

Term franchises frequently fail of their real purpose, due in part to the absence of provisions for the disposition of the property and reimbursement to investors, in the event that the franchise is not renewed. Utility properties under present-day regulation are no longer speculative money makers; investment in them is no longer regarded as a get-rich-quick scheme for extorting so much from the public during the life of the franchise that it is a matter of little consequence what happens to the property upon expiration of its term. The fact is emphasized that the public pays through the nose for the burdensome short-term franchise, first, because companies operating thereunder have to pay, at the ultimate cost of the car rider, high interest rates to meet their capital requirements, and second, because, having no assurance of his equities at the expiration of the franchise, the utility owner under the short-term franchise has naturally not been solicitous for the maintenance of physical property in good service condition.

On the other hand, improper franchise obligations imposed by municipalities in long-term and perpetual franchises, in their earlier efforts to protect the public interest, have been perhaps not less destructive, though as a class the perpetual franchise has furnished a stable basis for financing.

The growth of state regulatory systems which has paralleled development of public service businesses and the extent of results sought and thus far realized through exercise of the regulatory power, in the face of its natural economic limitations and of the obstacles to effective regulation presented by obsolete franchise provisions, is portrayed. The status of the street railway as a vital and fundamental thing in the life of the people is regarded as the basic proposition upon which all constructive thought and effort must build. As to this, the following has application:

> It is also axiomatic that so long as public service is provided with private capital, the character of that service will depend upon the financial results which it produces. If the service be adequate and there is a continuing loss, it will shortly become inadequate through an attempt to reduce the loss. This attempt may be temporarily or partially successful, but ultimately, due to continuing inadequacy, those losses apparently buried in the makeshift expedient of deferred maintenance and deficient service emerge inflated by concealed accumulations, to further depress capacity for that service basically required by public necessity. That public necessity in a given community will, in the end, rule and govern the nature of the agency, public or private, through which it must be satisfied.

As to public ownership, the report says:

> Public ownership and operation of its service facilities will not come as a result of political nostrum nor of academic theory. It may develop, if at all, as an economic necessity through the slow and tedious processes of a century, and would necessarily be preceded by much laborious work and actual accomplishment in the elevation of political standards and in the preparation of adequate foundations for stable and efficient state and municipal machinery, free of improper political influences, required to insure permanent success of the undertaking.

USE OF PUBLIC HIGHWAYS

Highways are defined simply as places dedicated to the use and convenience of the population at large in permitting the transportation of all things generally required in sustaining its social and economic life. The use of highways to carry gas or water underground, street cars on its surface or electricity through overhead wires means that the highway is fulfilling its destiny as the most ancient of all public utilities. The common sense of the proposition as developed is that the getting of an adequate service should be the sole consideration for the rights given as a legal step precedent to its production.

While no inherent value attaches to the base franchise, it may either be made valuable or turn out to be a very costly liability. This risk must be shouldered by the grantee. It is, however, pointed out that:

> If "value," in the sense of developed earning power of the property, arises out of earnings produced by enabling franchise, that value must necessarily exist as a condition precedent to the public receiving its consideration, which is "service," out of the franchise-contract. If there is no value arising through the franchise, from the standpoint of present and prospective earning power of the property, then obviously the public cannot possibly receive the thing for which it made a bargain.

After emphasizing the public interest in seeing the rights given by it in exchange for service acquire and develop value in the sense of earning power, the report goes on to say:

> It is likewise in the public interest that steps be taken to insure the public getting its part of "value" so developed in the form of service betterments and extensions. In these lie the real opportunity for the public to realize a proper share of the company's profits, if profits there be. To attempt to get that share through direct and indirect special levies on the company's income, other than just and non-discriminatory taxes, is to sell a public birthright for a mess of pottage. Such special levies can be made large enough to defeat the very object which is sought from the public viewpoint, *i.e.*, adequate and efficient service. They could not possibly be made large enough to fill any important financial requirement of the city. Thus they are destructive in one direction without accomplishing any important purpose in another.

An analysis of all franchises and ordinances bearing upon the Norfolk property disclosed that practically all of these imposed one or more of the following requirements, which it is stated "react harmfully upon financial resources needed for the building of service":

1. A requirement that railway company shall pay the cost of labor in all original paving and repaving work done between rails and two feet outside thereof.
2. A requirement that railway company shall bear cost of all repairs on track paving including the usual two-foot strip outside of rails, irrespective of what caused the paving fault.
3. A requirement that where tracks are laid in paved streets within the old limits of the city, railway company shall pay the cost of labor in repaving the entire street from curb to curb.
4. A requirement that railway company shall place and maintain culverts under its tracks from building line to building line.
5. A requirement that company shall adhere to certain service schedules on different lines during given seasons and over various hourly periods.
6. A requirement fixing fares and fare zones.
7. A requirement fixing free transfer points.
8. A requirement that all revenue derived by company from sale of transfers as authorized by ordinance be paid to the city, or 10 per cent of the gross earnings in excess of the gross earnings for the corresponding period of the year ending June 30, 1919, whichever shall yield most revenue to the city, but in no case to be less than $3,000 per month, so long as the said rates (6c. fare) are charged.
9. Limitation of the term of the franchise, without provision for purchase of the property by the city, in event the franchise is not renewed upon expiration.

It is then stated that requirements of the order above indicated have been one of the major causes undermining street railway service in Norfolk, and that if allowed to remain in full force and effect, the city cannot hope to escape a continuance of that character of service which has become familiar to its citizens, "damaging alike to a progressive development of their city, and to the company which should take a leading part in that development, as their duly authorized agent for that purpose."

CHARACTERISTICS OF PROPOSED NEW FRANCHISES

Only the principal characteristics of the required new franchises are outlined in the following:

Franchise Period

The State constitution of Virginia provides that no franchise can be granted for a period longer than thirty years, but it further stipulates that a city may become the owner of a public service property either without compensation or upon payment of a fair valuation. In view of the prohibition by state law of long-term or perpetual franchises, the report recommends that franchises be granted for a thirty-year period with the proviso that unless the same be renewed for a like term, the city will purchase the property.

Purchase Clauses

One of the main features of the proposed franchise consists of carefully qualified and protecting clauses, providing for purchase of the property by the city in event of non-renewal of franchises upon expiration. It is specifically stated that the purchase price is to be determined upon the basis of what the company would be entitled to receive in event of condemnation of its property as a going concern by state authority, the amount to be fixed by a board of arbitration whose findings shall be subject to review by the State Corporation Commission. Other principal provisions are quoted as follows:

Service and Property.—No attempt should be made to specify the frequency and capacity or service to be provided on the various lines, the character of equipment to be used thereon, nor the route over which the lines should be operated. In lieu of such futile conditions the new franchise should contain a definite and unmistakable provision "to require proper and adequate extensions of plant and services and the maintenance of the plant and fixtures at the highest practical standard of efficiency" as required by Section 105 of the city charter.

Additions and Betterments to Property and Service.—Franchises should specifically provide for the carrying out of a definite reconstruction, construction and extension program which will be required by the city as a result of this report.

Fares.—No conditions should be imposed establishing fixed rates of fare applicable throughout the term of the franchises, for the power to establish reasonable rates is reserved to City Council under the city charter and is subject to judicial review. Rates of fare, when they come to a test, will be fixed by variable controlling conditions other than franchise clauses, as has already happened in Norfolk.

Paving Repairs and New Paving Operation.—The company should be required to pay the cost to the city of repairing and making good all faults or breaks in street paving for which the presence or maintenance of its track is responsible. Where track exists in present paved or unpaved streets and the city desires either to repave or to construct an original pavement, it (the city) should assume the total cost thereof, holding the company responsible only for faults due to the company's tracks, as above provided. The city should reserve the right to do all paving work in the company's tracks, as and when it may consider this necessary, charging the company for its share of the expense in accordance with the foregoing.

Taxes.—It should be clearly understood by the public that these recommended francnise provisions would not relieve the companies of their obligation to pay the usual city and state taxes, as provided by law.

Uniform Franchise Terms.—It is manifestly to the advantage of the city that all franchises granted by it under which the street railway system is to be operated shall be for equal terms of years rather than to have the franchises for different sections of the system, which are and must necessarily remain integral parts of the transportation machine, expiring in various years.

Terminal at San Pedro Completed

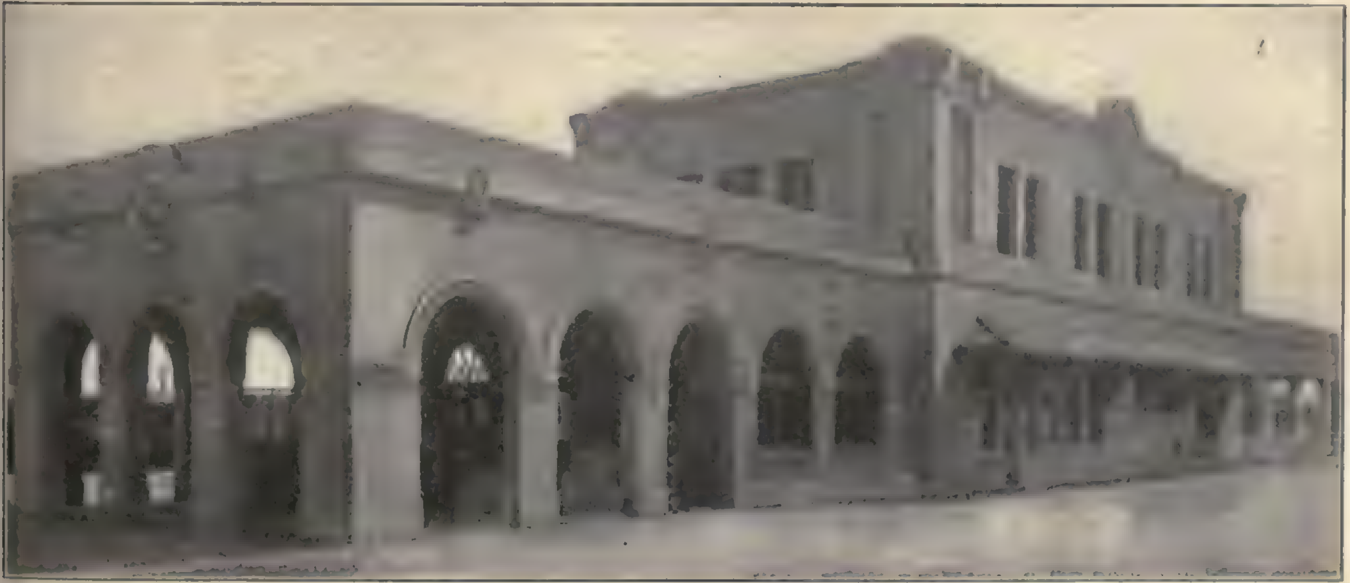
New Station Contains Not Only Ample Waiting Room and Freight Facilities, but Also a Rest Room for Employees

BY CLIFFORD A. ELLIOTT
Cost Engineer Pacific Electric Railway

THE Pacific Electric Railway has just completed and placed in service at Fifth and Front Streets, San Pedro, Cal., a combination freight and passenger station to serve its patrons in this rapidly growing community. It is designed adequately to serve the company's needs in the harbor district of the city of Los Angeles, San Pedro being the company's terminal point for serving this section. A tremendous growth has taken place in the harbor district during the past five years. To permit keeping pace with this expansion and to render the top-notch service demanded by the public in this locality the immediate erection of a permanent structure for station terminal purposes became imperative. Plans for this building were completed in 1917, but wartime conditions and delays incident thereto have somewhat hampered its earlier completion.

This structure, 28 ft. wide by 190 ft. long, is built with exterior of walls plastered. The main part of the building is two stories high, with a single-story wing at each end. One of these wings serves as an open waiting room, a type of construction extensively used by this company in its station buildings, because of the mild climate of southern California. The other wing furnishes space for an open freight room.

The building is semi-Spanish in its architectural fea-



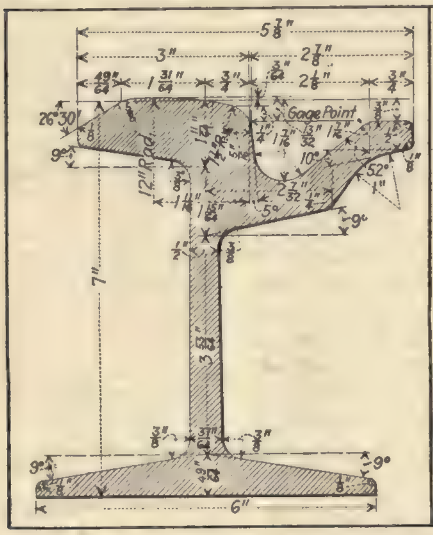
PACIFIC ELECTRIC RAILWAY'S NEW FREIGHT AND PASSENGER STATION AT SAN PEDRO tures. In the design neat appearance as well as utility and convenience were kept in mind. Spacious waiting and rest-room facilities have been provided, which are efficiently lighted with the latest type of fixtures. In the agents' quarters are three ticket windows. The freight business is concentrated at one end so that all business transactions with the public are made at the freight counter located at the side door.

The second story of the new station serves as trainmen's quarters. In the recreation room will be installed a pool table, card tables and other furnishings for the comfort and welfare of the trainmen. At the end of this room is the terminal foreman's office, where the "mark-up" boards, the cashier's office for handling trainmen's receipts, etc., are located. Adjoining these rooms are the toilet facilities and locker room.

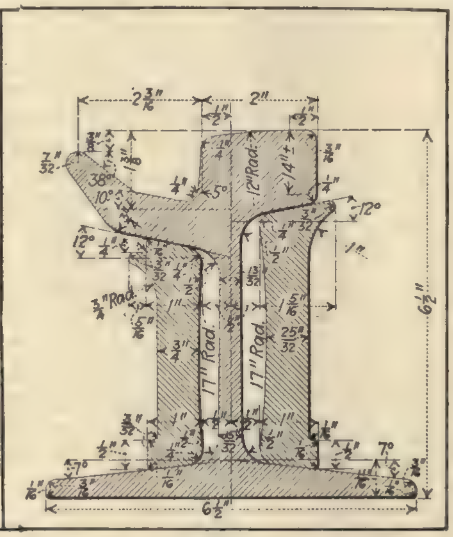
The station as a terminal is conveniently served by two newly constructed passenger loading and unloading tracks, while a new house track has been laid for serving the freight end of the station.

Rail Standards

IN AN article published on page 1106 of last week's issue, descriptive of the standard rail sections in this and other countries, the titles under the drawings showing the Australian rail section and the American rail section became transposed. The new French section, also illustrated in that article, was properly indicated by its title.



A. E. R. A. STANDARD 7-IN. GIRDER GROOVED RAIL



NEWLY ADOPTED AUSTRALIAN RAIL SECTION

To make the matter perfectly clear, sections of the newly adopted Australian rail and of the standard 7-in. girder grooved rail of the American Electric Railway Association are reprinted here.

After a careful survey of the Highland district of Scotland, plans for nine different water-power schemes have been reported. Because of this cheap and dependable source of power, serious consideration is being given by the directors of the Highland Railroad to electrification. One of the schemes could give 38,000 hp. with a capital cost of about £1,742,000, and another 42,000 hp. at an outlay of about £1,580,000. It is estimated that the full development of the nine schemes would be equal to twice the capacity of the existing power, traction, and lighting companies in Scotland. Cheap industrial power will also result.

"Vae Jitnis" at Terre Haute

THE old Roman cry of "Vae Victis" or "Woe to the vanquished" has its modern counterpart at Terre Haute, where the cry might be transmuted into "Vae Jitnis" or "Woe to the jitney"! It will be recalled that the ELECTRIC RAILWAY JOURNAL for Aug. 28, 1920, presented, under the title "The Survival of the Fitter," the success of the safety car in securing ever-increasing business. The great growth of the private automobile has continued—perhaps to the actual advantage of the trolley by getting people eager to ride whenever they see anything that moves—except jitneys. This conclusion seems inevitable from a study of the accompanying progress table prepared by E. M. Walker, general manager Terre Haute, Indianapolis & Eastern Traction Company. This table brings the facts down to Oct. 30, 1920.

Among the interesting facts disclosed are that the traffic for the ten months of 1920 is greater than the high-water mark established by all of 1919, so that even the abatement of pre-election excitement will not prevent 1920 from showing at least 12,500,000 passengers, or some 30 per cent better than the pre-jitney year 1913, when the population was 80 per cent of the present figure. Put differently, the traffic will increase at least 30 per cent compared with the 25 per cent increase in population (60,000 to 75,000) despite the 511 per cent increase in private automobiles (900 to 5,500) within Terre Haute or the 550 per cent increase (300 to 1,950) outside Terre Haute.

As to the jitneys, a count on Wednesday, Nov. 10, showed only twenty-three in use. Of these only seven were in direct competition with the cars. The jitneys charge 10 cents; the cars 5 cents with free transfer.

The drop from 200 jitneys in 1918 to twenty-three of all persuasions in November, 1920, is notable.

Other interesting figures in this report are those showing the continued increase in earnings per car-mile and the decrease in energy consumption per car-mile as the safety cars approach the 100 per cent mark, except for the 300 miles a day of interurban operation over city track.

	1913	1918	1919	1920 (10 mos.)
Population	60,000	68,000	72,000	75,000
Number of autos owned in city	900	4,300	5,100	5,500
Number of autos owned in Vigo County outside of city	300	1,500	1,700	1,950
Miles of city track	30	30	30	30
Revenue passengers carried	9,507,018	8,160,492	10,351,042	10,837,544*
Employees carried	309,515	259,139	302,662	306,771*
Complimentary	66,896	39,694	7,299	315*
Transfers	2,095,372	2,200,114	2,603,427	2,447,050*
Total passengers	11,978,801	10,659,439	13,264,430	13,591,680*
Gross revenue, city lines	$452,736	$394,824	$518,627	$542,710
Jitney buses in operation	0	200	125	23
Car-miles, safety cars	0	77,572	1,428,380	2,204,310*
Car-miles, two-man cars	1,968,400	1,717,597	1,036,802	298,406*
Total car-miles	1,968,400	1,795,169	2,465,182	2,502,716*
Kilowatt-hours	3.87	3.52	2.67	2.21
Earnings per car-mile, all city cars	$0.2300	$0.2109	$0.2103	$0.2168
Earnings per car-mile, safety cars		$0.2100	$0.2110	$0.2222
Safety cars operated	0	(Dec.) 18	28	50
Two-man cars operated	29	15	15	3
Total cars operated	29	33	43	53
Rate of fare, cents	5	5	5	5
Tickets	25/$1.00 6/25c.	25/$1.00 6/25c.	None	None

* Ten months only.

British Municipal Tramway Men Meet

Papers Presented at the Annual Conference of the Municipal Tramways Association Discuss Fare Increases, Extra Operating Costs, Repairs, Depreciation and Future Capital Expenditures

AT THE annual conference of the Municipal Tramways Association a good idea of the current expert opinion on economic and financial questions was obtained of the street railway industry in England. Fundamentally the problems and conditions with which the industry is confronted are quite similar to those in this country, although, perhaps, they are of more recent origin. It is realized that to relieve the density and overcrowding of small districts ample transportation facilities must be provided to enable the great industrial population to spread themselves out over wider areas. Whatever form these facilities take, whether the motor bus for light traffic or the tramway, which holds the field where the density is high, the fact remains that the passenger must pay for his passage.

Two papers on tramway fares were presented by Councilor Higham, chairman of the Blackburn Corporation Tramways Committee, and P. Priestly, general manager Liverpool Corporation Tramways. Unfortunately, with the increased cost of producing rides, Councilor Higham stated that the tramway systems have not been able to pass on this increased burden to customers with the same facility as other industries. If places of heavy traffic density cannot be made profitable without increased fare, it can never be hoped to make up the deficit from the riders who travel longer distances. There still clings the old system under which workmen are carried at a reduced fare due to their former low wages. With their greatly increased compensation, it is maintained this condition should no longer be allowed to exist. The opinion also was expressed that wherever a special service was rendered a special fare should be charged, under such circumstances as strangers to a town attending race meetings, football games, etc. Special fares are warranted because of extra accommodations furnished for their convenience.

Some of the blame for the slow increase has been due to the reluctance of the municipal corporations. To prevent too strong reaction on the public, the process of raising fares should be made slow and gradual. Even then traffic will decrease, but this temporary condition is of short duration. However, when the riding public gains the realization that it now costs a transportation system twice what it formerly did to furnish rides the outlook for more flourishing undertakings of this nature and also for more return on capital becomes encouraging.

Many suggestions were offered by A. L. C. Fell, general manager London County Council Tramways, in his paper on operating costs and power expenses to effect a reduction in the cost of power. For the past six years fuel, which represents about 75 per cent of the energy cost, has been expensive and of extremely poor grade. Because of the fuel shortage everything available had to be taken in spite of the fact that most of it, after being shipped long distances, was hardly more than mine refuse, containing as high as 30 per cent ash. Should the whole system regarding the grading of coal be co-ordinated by the shippers so that the poorest grades would be utilized nearest the mines and the better quality shipped the farthest distances a great economy would result. Great benefit can be derived from the economy recently obtained in the generation of power with oil fuel. There is not only the added boiler efficiency but also the economy resulting from more advantageous handling and transportation facilities than are available for coal.

Messrs. James Dalrymple, general manager of the Glasgow Corporation Tramways, and R. L. Horsfield, general manager of the Cardiff Corporation Tramways, both presented papers under the title "Repairs and Depreciations in Relation to Capital and Revenue." Mr. Dalrymple argues that people nowadays seem to have a great aversion for the word "capital" and that many municipal authorities seem quite prepared to pay high wages to employees, but at the same time entirely overlook the fact that in a short time their capital, as represented by the track and equipment, will go out of existence. Mr. Dalrymple contends for a program of keeping the physical property in a complete state of repair, and in addition setting aside a fund representing the depreciation which has taken place during the previous twelve months.

Reporting an examination which he had made into the physical and financial condition of many tramway undertakings, he finds that where there is too little spent in repairs there is also nothing available to meet depreciation and renewal. On the other hand, tramways which maintain a good state of repair also maintain considerable renewal funds. In other cases, renewals are being added to capital, and in still others renewal and depreciation funds are being robbed in order to maintain low rates. In other places plant and equipment are being starved to obviate the necessity for increased rates. In general, the tramway capital is being tampered with in order to meet current administrative expenses of the municipalities. Mr. Dalrymple points out that the renewal of track is a grave matter because track cannot now be installed for less than three times its original cost, and it is therefore extremely important that the track which is now existing should be kept in a high state of repair.

Mr. Horsfield calls attention to the error in announcing a profit without any provision for renewal and without any provision for establishing or building up the "property restoration fund" which is required under the law. The general theme of his paper is to support the building up of renewal funds in order to maintain a properly serviceable equipment.

In the discussion which followed several members argued that the present generation should not have to shoulder the whole cost of maintaining an undertaking, but that if renewals are high today money should be borrowed to maintain the property for the present and future generations.

An interesting paper on the future of capital expenditure was presented by R. S. Pilcher, manager Edinburgh Corporation Tramways. Mr. Pilcher starts by pointing out the oft-repeated comparisons between pre-war cost of permanent way construction and present cost, between pre-war rolling stock cost and present day cost, and some other figures. He states that the question of new capital expenditure would solve itself if the revenue to be derived could be made to increase in the same ratio as working expenses. He points out that the process of increasing the cost of travel must necessarily be slow and gradual if the tramways are to reap the benefit, otherwise they will lose the traffic. If fares are raised gradually, it will not be felt so much by the public. He then discusses the public psychology in its willingness to pay the increased cost of most commodities but not of tramway fares. He expresses hopefulness for the future in this respect and an ultimate satisfactory financial position for the tramways.

He discusses the present situation in its relation to the high cost of new construction and points out that the development of transport as such is not going to be retarded, but says that if tramways, on account of the high cost of permanent way, are to be temporarily restricted, more attention will be given to forms of traction which require the least capital expenditure, namely, such forms as the motor bus and the trackless trolley.

He says that one cannot but see the effect that high capital costs are bound to have upon the development of the bus. There is undoubtedly a great field for this vehicle which can deal with extensions and new routes without any relatively great capital expenditure. He asks how many tramway systems there are in England where certain routes do not pay their way and which have never paid sufficient to justify the laying down of the permanent way. He points out that it is probably cheaper to work these routes than to scrap them, seeing that the capital has already been sunk, but makes the point that in the future when the question of the renewal of the permanent way of some of these has to be considered many such routes will be worked by motor buses or other railless vehicles.

He quotes some interesting comparative figures which he has recently worked out for the new construction of tramways compared with motor buses in the city of Edinburgh, which he gives as follows:

System	Capital Cost	Interest and Sinking Fund Charges per Annum	Interest and Sinking Fund Charges per Mile
Cost of new electric undertaking...	£1,677,600	£109,127	4.547d.
Cost of converting cable system....	£695,700	£56,014	2.334d.
Cost of providing a similar number of buses....................	£456,640	£64,131	2.672d.
Cost of providing buses to give the same seating capacity..........	£729,900	£103,155	2.886d.

Mr. Pilcher then goes on to discuss the figures given in this table and says:

It will be seen that the bus has a considerable advantage in capital expenditure over the figures for a complete new electric system, even providing for the same total seating capacity. On the other hand, of course, it is generally admitted that the working expenses of the bus are higher than the electric car.

Although the total cost of operating motor buses per mile may be higher than it is with electric traction for a city such as Edinburgh, it must be kept in mind that the capital cost per bus-mile remains a constant figure in relation to the number of buses in operation, whereas with electric traction the capital costs per car-mile increase in direct ratio to the decrease in the volume of traffic to be carried, or, the smaller the mileage run the higher the capital cost per mile, and inversely, the greater the car-mileage the less the capital cost per mile. When the suburban routes have been fitted, or routes which have not a heavy traffic, the cost of capital expenditure for electric cars becomes prohibitive. It is in these circumstances that the motor bus will become the cheaper vehicle to operate. The total cost of capital expenditure depends upon the frequency of the bus service. The bus may be made to pay when the service is increasing, the only condition being that the vehicle will require to be fairly well filled with passengers. Future extensions and new routes will probably take the form of motor buses, or other vehicles not dependent on a costly permanent way. New transport will be provided and faster vehicles will be used and development will be cut. I have seen in some districts motor buses running along tramway routes practically in competition with the tramways and worked by the same operating authority. I do not think this is going to help either the tramway or the motor bus. The bus should be used where the tramway cannot be used and the one vehicle made supplementary to the other. I do not think they need be competitive.

It may be of interest to the conference to know that in Edinburgh the intention is to run all the extensions with buses, and at the present time we are closing down four cableways which have not a great volume of traffic, being under £270 per week per mile of route. The tramway rails are worn out and it would not pay to renew the permanent way at present prices. Instead of spending new capital on a tramway where the traffic is not sufficiently heavy to pay the high capital charges motor buses are to be run. Only the future can tell at what point it will pay to lay tramway rails.

In the discussion which followed the presentation of this paper there was much difference of opinion expressed. Specific question was raised with reference to the use of the railless electric vehicle rather than the motor bus, when the question of track removal was the principal one.

Other points in the discussion were that consideration should be given to open track construction for some extensions, which gives advantage not only of lower costs but also of higher speed and reduced maintenance cost.

San Francisco Municipal Accident Record

THE Municipal Railway of San Francisco, Cal., has made public its accident record for the fiscal year ended June 30, 1920. This is reproduced herewith and the corresponding figures for the year ended June 30, 1919, are given for comparison in a parallel column.

ACCIDENT RECORD SAN FRANCISCO MUNICIPAL RAILWAY
(For fiscal year ended June 30)

	1919		1920	
Total passengers carried during the year..................	59,341,253	......	66,169,246	
Car-miles operated [1]	7,212,762.50	......	7,419,272.33	......
Number of passengers to mile...	8	......	9	......
Number of accident reports filed [2].....................	1,972	......	2,019	......
Number of accidents—fatal....	10	......	7	......
Number of accidents—personal injuries..................	693	......	657	......
Number of claims presented....	472	......	344	......
Number of claims adjusted.....	109	......	104	......
Number of suits instituted.....	18	......	24	......
Number of suits pending.......	24	......	42	......
Number of passengers carried per accident report.........	30,092	......	32,773	......
Number of passengers carried per personal injury report...	85,629	......	100,714	......
Number of passengers carried per fatal accident...........	5,934,125	......	9,452,750	......
Classification:		Ratio		Ratio
Car collisions.................	164	0.0832	112	0.0555
Auto and wagon collisions......	1,100	0.5577	1,231	0.6097
Boarding moving car...........	171	0.0868	157	0.0777
Leaving moving car...........	108	0.0548	126	0.0624
Miscellaneous................	429	0.2175	393	0.1947
Total....................	1,972	......	2,019	
Accidents in per cent of passengers carried..............	00.0033	......	00 003	......
Total receipts................	$2,425,761	......	$2,749,651	......
Total amount paid accident claims, office and miscellaneous expense..............	27,070	......	32,830	......
Ratio to operating revenue.....	....	0.0111	....	0.0119

[1] For 1919 this involves 6,899,677 car-miles and 313,095 bus-miles; for 1920, 7,182,475 car-miles and 236,797 bus-miles.

[2] This includes all reports of accidents happening near the cars in which this railway was not involved.

Application of Electric Traction on Trunk Lines

In Address Delivered Recently in Belgium, Sir Philip Dawson Outlined the World Situation in General and the Belgian Problem in Particular

IN A PRESIDENTIAL address recently delivered by Sir Philip Dawson before the Association of Electrical Engineering Graduates of the Montefiore Technical Institute, Liége, the subject of heavy electric traction was covered in a general way, with special reference to conditions in Belgium. This address is significant because Sir Philip has been serving as a member of the electrification commission of Belgium and he is also a member of the advisory committee on electrification appointed by the Minister of Transport of Great Britain.

Sir Philip said that electric traction is justified only where it will conduce to financial success. This he considered an axiom which must never be lost sight of except under particular and exceptional conditions. It follows that the plan to be adopted in any individual case must be that estimated to produce the largest possible return on the necessary capital, with due regard to all constituent factors directly or indirectly influenced by electrification.

In studying an electrification project three points must be considered, as follows: (1) The total investment required, including all necessary electrical, mechanical and other works; (2) the cost of operation, involving all operating expenses affected by this mode of traction; (3) the cost of maintenance of all parts which are affected by the installation of electric traction.

SOME SALIENT POINTS OF AGREEMENT

Before taking up in detail the application of electric traction to trunk lines Sir Philip reviewed briefly the axioms which, he said, are more or less generally admitted by those who have studied the problem deeply. He stated that the higher the costs of fuel and labor the more is electrification justified and listed a number of items, some of which were as follows:

1. Sixty-cycle turbo-generators cost less than 25-cycle machines.

2. Rotary converters for traction are more satisfactory at 25 cycles than at 60 cycles, and for 1,500 volts it is necessary practically to put two rotaries in series. Motor-generators are at present employed for voltages of 2,400 to 3,000.

3. Three-phase generators cost less than single-phase generators.

4. Direct-current motors of 600 to 1,200 volts are cheapest to install and maintain, and weigh least.

5. There is actually little difference between the cost of a high-tension direct-current equipment (2,400 to 3,000 volts) and a single-phase equipment.

6. To date there is no practical example of multiple-unit trains operating on direct-current lines of 2,400 to 3,000 volts.

7. At the moment there are four systems which have been applied for a period sufficiently long and on a scale sufficiently large to permit studying the results, as follows: (a) Low-tension direct-current lines, with third rail, 600 to 1,500 volts, applicable with multiple-unit cars or locomotives. With locomotives it is necessary at junctions and at classification stations to maintain the continuity of the contact line by means of an aërial line. (b) High-tension direct-current lines, 2,400 to 3,000 volts, with aërial contact wire, on which only locomotives can be used. (c) Three-phase lines, 3,000 to 5,000 volts, 15 cycles, two aërial wires per track, on which multiple-unit cars cannot be employed. This system facilitates regeneration on down grades and in braking. (d) Single-phase lines, 15 to 20 cycles, 11,000 to 16,000 volts, with aërial contact wire, on which it is possible to use both multiple-unit cars and locomotives.

8. The maintenance of the aërial line in the case where there is no steam traction is less costly than that of the third rail, but the presence of the third rail increases the track maintenance cost.

9. The higher the contact-line voltage is elevated, the less will be the cost of substations and distribution.

10. On certain old lines it is possible that the cost of increasing the height of bridges would be great, and this must be taken into consideration in estimating capital necessary for electrification.

PRO AND CON REGARDING SINGLE PHASE

Single-phase current has an unfortunate effect on telegraph and telephone lines in the neighborhood, but this interference can be reduced and nearly eliminated by auxiliary installations more or less costly. As to low voltage direct-current motors, there will not in the future be very great progress in regard to their efficiency or their cost. On the contrary, the single-phase system is subject to very great improvement, as has been demonstrated by recent developments in Switzerland and America.

The necessity for raising the voltage for traction on trunk lines caused the introduction of single phase, and it is this introduction which has resulted in the development of direct current at 3,000 volts and the improvements in the direct-current motor.

First cost, maintenance cost and weight of single-phase equipment are higher than those of direct-current equipment at low voltage, but differ little from those of high-tension direct-current equipment.

Regeneration is easiest with three-phase, but can be accomplished also satisfactorily with direct current and single phase. Also, it is easier to handle the small, high-tension current than the large, low-tension current.

TENDENCIES IN DIFFERENT COUNTRIES

Both Switzerland and Sweden have decided in favor of the single phase for electrification of their trunk lines. Prussia, the Grand Duchy of Baden, Bavaria and Austria had reached the same conclusion before the war. Italy has, up to the present time, preferred the three-phase.

In America opinions as to systems are divided. In all cases it has apparently been decided that for heavy trunk-line traction the aërial conductor is preferable to the third rail.

In England there are no examples as yet of trunk-line electrification, the only electrifications being those of suburban systems. The London, Brighton & South Coast Railway, having always had in view the electrification of its principal lines to Brighton, Worthing and Eastbourne, adopted the single-phase at a time when the only existing systems were direct current at 750 volts and three-phase at 3,000 volts.

The Northeastern has an electrification project regarding its line from York to Newcastle, with direct current at 1,200 volts, third rail and with an aërial wire at junctions, passenger stations and freight stations. In another project the adoption of 3,000 volts with a three-wire system and two third rails is under consideration. The track rail would serve as the neutral wire, and each train unit and locomotive would have the same number of motors on both circuits to maintain a load balance.

In France a commission which has studied the question of system in Europe and the United States appears to have concluded in favor of direct current at 3,000 volts, with aërial wire, at the same time anticipating great possibilities of future development of the single phase. This commission apparently has been influenced largely by the question of telegraphic disturbances and by the fact that the Germans were largely instrumental in the development of single phase.

The application of electric traction to railway trunk lines will have a great effect on the production of electricity, and above all on its application in other domains of industry. This influence will vary according to the case and will have in its turn an influence on the system of electric traction to be adopted.

In considering this point of view, there are certain typical cases which present themselves and which may be summarized as follows: (1) The case of a system crossing an agricultural country without great industries, such as that traversed by the London, Brighton & South Coast Railway on the line to Eastbourne, Brighton and Worthing, and without water powers; (2) a non-industrial country where there is no coal but where there are sources of hydro-electric power, such as certain parts of Switzerland and Italy; (3) a country having coal and metal industries, such as that traversed by the Northeastern Railway; (4) an industrial country with metallurgical resources and hydro-electric power but without coal, such as Sweden.

In the first case the demand for energy for electric traction will form the preponderating part of all electrical energy requirements. In the second case it may be that political and military reasons may force electric traction, as is the case in Switzerland. In the third and fourth cases traction will require perhaps a relatively small part of the total electrical energy produced in the country, but the utilization of electrical energy for traction will improve power plant load factors and reduce the price of the electrical energy.

There are intermediate cases, as in London, where electric traction will aid in the amalgamation of the electricity-producing interests now existing, and the creation of new super-power plants which would not be possible otherwise from the economic point of view. In Greater London, for example, the electrical energy necessary for the lines already electrified, or which must be electrified in the near future, is as much as 1,500,000,000 kw.-hr. per year, while the consumption for all other purposes is hardly 500,000,000. The complete electrification of the suburban systems of the London, Brighton & South Coast Railway will alone absorb 250,000,000. In Chicago, in 1915, the electrical energy absorbed by the traction lines was 680,000,000 kw.-hr., while that utilized for other purposes did not reach 400,000,000, Chicago having a population one-third that of London. A concept of the quantities of electrical energy required for traction can be gained from the statement that in 1918 Great Britain produced 4,000,000,000 kw.-hr., while the United States produced 28,000,000,000.

Obviously in the study of new power plant installations the demands of electric traction will play an important rôle and will render necessary the installation of super-power plants which would not be justified otherwise. This will permit the production of energy in quantity and the furnishing of it for other purposes at a price otherwise impossible. Again, however, the financial return must be considered from the start. A super-power plant will justify itself only when from the start it will have a good load factor. The location of the power plant also plays an important part in this matter.

THE "WHY" OF ELECTRIFICATION

The principal causes which have led to the application of electric traction on trunk lines in the past may be summarized as follows:

1. The difficulties of ventilation of the tunnels, which led to the electrification of the Baltimore & Ohio in Baltimore in 1894, and later to that of the tunnels in Paris, London, Budapest, Berlin and New York, as well as in Switzerland, Italy and other countries.
2. Competition of the electric tramway and the omnibus.
3. Danger of fire from steam locomotive sparks.
4. The greater facility of traction on heavy grades due to the better adhesion and the economies of regeneration.
5. In the case of counties having no coal, independence on foreign countries for transportation.
6. Increase in capacity of existing lines.
7. Economy of coal consumption, estimated at from 50 to 66 per cent.

As to the results obtained from electric traction, experience gained with electric tramways has been confirmed with railroads; the greater the facilities for travel, the greater the number of travelers. Electrification of a part of the suburban system of the London, Brighton & South Coast Railway and of the London & Southwestern Railway has increased the number of passengers and the receipts more than 100 per cent. Of course, it does not follow that the same results will be obtained everywhere; that depends upon the particular circumstances met with in each case.

One of the great successes of electrification results from the facility with which trains may be divided up into multiple units, according to the needs of the public at different times of the day. It is the frequency of the trains, not the necessities of the clock, which encourages passengers in forming the traveling habit.

As regards freight traffic, the electric locomotives are more efficient and economical than steam. They do not consume energy and do not deteriorate, except when producing traction, whereas a steam locomotive is deteriorating and consuming combustible as long as it is in service. One electric locomotive does much more work than a steam locomotive, as for example on the Norfolk & Western in America.

The length of railways in the entire world is about 745,000 miles, of which 264,000 miles is in the United States and 29,000 miles in England. On a single-track basis, these figures become respectively 398,000 miles and 62,000 miles. In the United States there are nearly 8,100 miles of single track operated electrically, employing 675 electric locomotives. The railways of the United States consume about 25 per cent of the coal produced, while the railways in England consume only 6 per cent of the coal produced in England. The latter low figure is due to the great export traffic in coal and to the enormous demands of the British marine. In Europe, while electric operation is limited, the number of electric locomotives employed is not much less than in the United States.

In view of the different systems of traction in existence and the youth of electric traction, the question arises as to whether there is a possibility of a single system which can be adapted to all cases. This is without doubt an attractive ideal, but on account of the divergent views of manufacturers, engineers and administrators it will be realized with difficulty, if ever.

It is clear that in the case of the increases in costs resulting from the war, which will long continue, there would be no financial advantage in changing the scheme of electrification of the large systems electrified at 600, 750 or 1,200 volts, to say nothing of the 2,400 or 3,000-volt systems. For the long distances to be covered by heavy trains, especially in cases where a dense and continuous traffic does not exist, a voltage of 600 to 1,200 is not sufficiently high.

For the present, at least, two systems must be used, one for intense suburban traffic and the other for trunk lines. In the first case 600 to 1,200 volts, direct current, will be employed, with third rail; in the second, overhead conductor must be used with high tension, 3,000 volts direct current or 11,000 to 16,000 volts single phase. The question comes back then to determining which of these systems in the end will be shown to be more advantageous financially. A still more desirable solution would be one permitting both systems to use the same track rails and to take current from the same distributing system.

ELECTRIFICATION AND THE SUPER-POWER PLANT

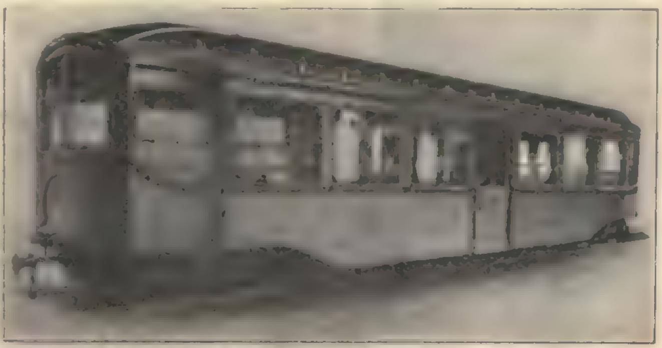
The futures of electric traction and of the super-power plant are intimately related. Unfortunately in England, as well as in the United States, the public press appears to believe that electric traction must be applied universally from now on; that it will lead immediately to great economies and to great financial advantages, and that the only thing to do to obtain energy at a very low price, without consideration of the attendant circumstances, is to build a super-power plant and all will be well.

As to Belgium, in view of its relatively small area, its dense population, its frugal and industrious people, its well-developed metallurgical and other industries, its excellent railroad systems and its fuel resources, its railways can be compared with a vast suburban system. If there is a case where a complete electrification would be justified, that case presents itself in Belgium. Here it is necessary to study fundamentally the electrification of the entire system, in such a way that the sections which are to be electrified now will form a homogeneous part of the whole from the points of view both of traction and distribution. Such a study will be costly, but when millions of francs are involved it seems worth the investment of some hundreds of thousands of francs so as to insure the obtaining of the best possible financial results.

Center-Entrance Cars in Germany

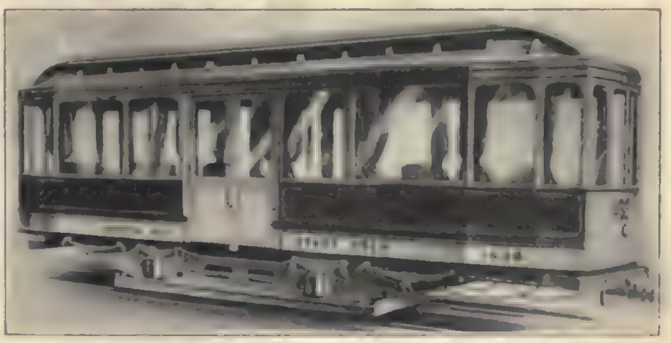
The Construction Details, While Giving a Pleasing Effect, Are More Elaborate Than Would Be Considered in the United States

TWO new types of electric cars for street and interurban service in Germany are shown in accompanying illustrations. The single-truck type is for service in Cologne and has a step as part of the truck construction. The truck has pressed steel sides and an angle-iron framework. This car is 29 ft. long, 7 ft. wide, 10 ft. 10 in. high over roof and has a wheelbase of 8 ft. 6 in. It weighs 15,730 lb. and has a seating capacity of twenty-six passengers and a total capacity of forty passengers.



SUBURBAN AND INTERURBAN TYPE OF CAR

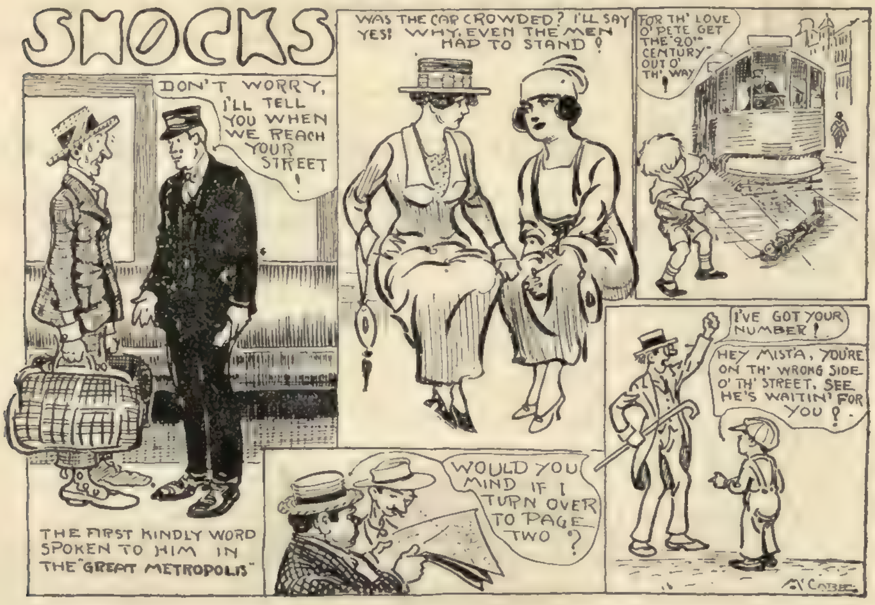
The Bonn-Mehlen interurban car has a well at the center so that passengers may step directly into the car with a single step. There are two steps from the center compartment up into the end compartments. This car is 42 ft. long, 7 ft. 6 in. wide and 9 ft. 10 in. to the top of the roof. The car weighs 27,500 lb. and has a seating capacity of forty-four with a total capacity of sixty-six under normal conditions and a maximum of seventy-eight passengers.

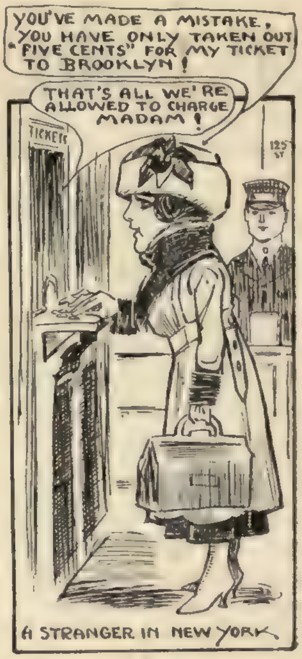


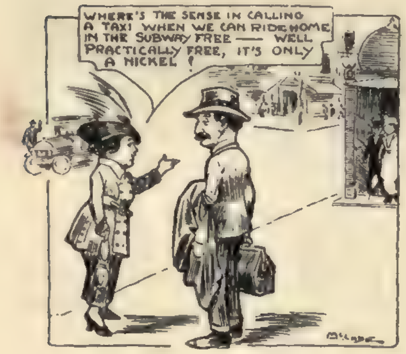
SINGLE-TRUCK CENTER-ENTRANCE CAR FOR CITY SERVICE

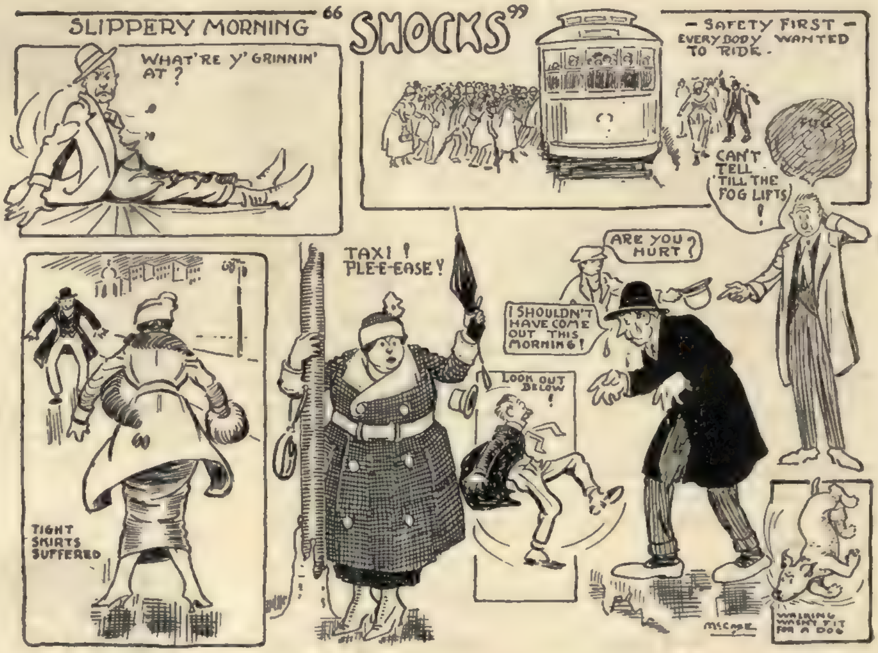
These cars are provided with both longitudinal and cross seats and have electric heaters. All doors slide into pockets and the interior is provided with sliding doors between the center compartment and the end compartments.

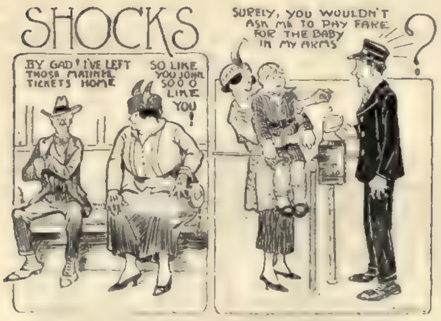
As Seen by the Cartoonist

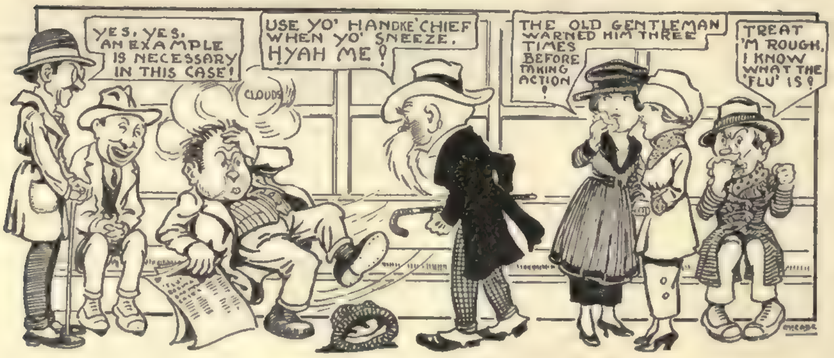

SHOCKS
DON'T WORRY, I'LL TELL YOU WHEN WE REACH YOUR STREET!
THE FIRST KINDLY WORD SPOKEN TO HIM IN THE "GREAT METROPOLIS"
WAS THE CAR CROWDED? I'LL SAY YES! WHY, EVEN THE MEN HAD TO STAND!
FOR TH' LOVE O' PETE GET THE "20th CENTURY" OUT O' TH' WAY!
WOULD YOU MIND IF I TURN OVER TO PAGE TWO?
I'VE GOT YOUR NUMBER!
HEY MISTA, YOU'RE ON TH' WRONG SIDE O' TH' STREET. SEE HE'S WAITIN' FOR YOU!
McCABE

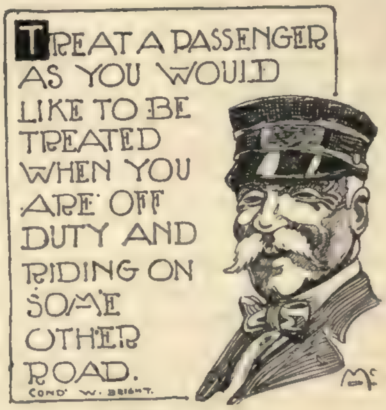

YOU'VE MADE A MISTAKE, YOU HAVE ONLY TAKEN OUT "FIVE CENTS" FOR MY TICKET TO BROOKLYN!
THAT'S ALL WE'RE ALLOWED TO CHARGE MADAM!
TICKETS
125 ST
A STRANGER IN NEW YORK


WHERE'S THE SENSE IN CALLING A TAXI WHEN WE CAN RIDE HOME IN THE SUBWAY FREE —— WELL PRACTICALLY FREE, IT'S ONLY A NICKEL!
McCABE


SLIPPERY MORNING
"SHOCKS"
WHAT'RE Y' GRINNIN' AT?
- SAFETY FIRST - EVERYBODY WANTED TO RIDE -
CAN'T TELL 'TILL THE FOG LIFTS!
FOG
TIGHT SKIRTS SUFFERED
TAXI! PLE-E-EASE!
ARE YOU HURT?
I SHOULDN'T HAVE COME OUT THIS MORNING!
LOOK OUT BELOW!
WALKING WASN'T FIT FOR A DOG
McCABE


SHOCKS
BY GAD! I'VE LEFT THOSE MATINEE TICKETS HOME
SO LIKE YOU JOHN SOOO LIKE YOU!
SURELY, YOU WOULDN'T ASK ME TO PAY FARE FOR THE BABY IN MY ARMS
?


YES, YES. AN EXAMPLE IS NECESSARY IN THIS CASE!
USE YO' HANDKE'CHIEF WHEN YO' SNEEZE. HYAH ME!
CLOUDS
THE OLD GENTLEMAN WARNED HIM THREE TIMES BEFORE TAKING ACTION!
TREAT 'M ROUGH, I KNOW WHAT THE 'FLU' IS!
McCABE


TREAT A PASSENGER AS YOU WOULD LIKE TO BE TREATED WHEN YOU ARE OFF DUTY AND RIDING ON SOME OTHER ROAD.
COND' W. BRIGHT.
McC

This is another group of McCabe's cartoons, taken from recent issues of the "Interborough Bulletin." A previous selection was published on page 974 of the issue of this paper for Nov. 6.

ELECTRIC RAILWAY PUBLICITY

Devoted to How to Tell the Story

Two Scenario Suggestions Presented

Work of Two Film Companies Printed Here to Inspire Discussion and Criticism on Use of Film in Publicity Work

THESE pages have carried considerable discussion about the suggestion made on page 604 of the Sept. 25 issue to utilize the splendid educational strength of motion pictures in behalf of the electric railways in their necessity to win public approbation, or at least to dispel public prejudice. Of all the letters received commenting on the idea none has expressed the belief that the use of pictures in a broad national way was impractical, but several have reiterated the thought expressed in the original article that the making of an effective film would be difficult and would require a great deal of thought by a number of able men.

The JOURNAL has endeavored to learn something of the seriousness of this difficulty by enlisting the aid of two prominent film producers, the Rothacker Film Manufacturing Company and the Atlas Educational Film Company, both of Chicago. Three scenario writers of these companies, after several conferences with one of the editors of this paper, each outlined a scenario suggestion which he thought could be used as the vehicle to carry the message desired, as he had interpreted the problem. Two of these scenario suggestions are published herewith, for the purpose of putting before the industry something concrete to discuss and criticise. It is not contended that either of them would meet the requirements, though they do show a good grasp of the problem for so short a study on the part of the authors. It was thought that with these definite suggestions to start one thinking along the line of a scenario for broad street railway use it would be possible to induce a real discussion of the matter out of which would come some sound counsel on what ought and what ought not to go into such a picture, and perhaps some suggested themes for other scenarios. It will be out of such a variety of thought that the final product will crystallize, and the more discussion that can be brought out now the easier will be the task of an official committee later on. The JOURNAL will be glad to receive the thoughts of readers about the scenario suggestions.

Scenario Suggestion No. 1

The writer of this scenario quotes a statement from the report of the Federal Electric Railways Commission as the keynote of the object of this picture as follows:

"The electric railway furnishing transportation upon rails is an essential public utility and should have the sympathetic understanding and co-operation of the public if it is to continue to perform a useful public service."

It is to give the general public this "sympathetic understanding" of the situation confronting the street railways of our land that the story has been written. The story, as it will be unraveled in picture form to the public, begins.

"Boss" Bailey, an unscrupulous political boss of a Mid-West city, learns that the local street railway company has failed to comply with the provision of its franchise requiring it to construct at least three miles of new track each year. The reason for the failure interests the boss not at all, but the possiblity of ousting the present company and granting a new franchise suggests a golden opportunity.

Accordingly "Boss" Bailey calls on Harry Carson, the local prosecuting attorney, who had been nominated and elected through the boss's influence. With apparent indignation "Boss" calls attention to the deplorable service the street railway company is rendering, picturing old style, overcrowded cars and people having to wait, unable to get on the cars.

And then the "Boss," concealing his own ulterior motive under the guise of deep concern in the city's welfare, points out that these abuses need not be longer endured; that the company has technically violated its franchise; and that it is Harry's duty as public prosecutor to oust the company and permit a franchise to be given to a company which will handle properly the local transportation problem.

Harry Plans Ouster Proceedings

The appeal is effective. Harry, intensely conscientious and public spirited (despite the fact that presumably he is one of the boss's men), immediately prepares to start ouster proceedings—to the delight of "Boss" Bailey, who begins laying wires for a grand "killing" for himself and his friends.

But before filing the papers Harry, naturally square and aboveboard, realizes it is no more than fair to talk the matter over with the railway company, so he calls on the president. To Harry's surprise, the president of the company attempts no denial of the wretched service the company is giving. On the contrary, he freely admits this and deplores the company's inability to do better without an increased rate. He explains that the present 5-cent fare and other franchise terms were based on pre-war conditions. That since then wages have increased enormously, likewise the cost of cars and equipment; that for the past two years the company has barely earned the interest on its bonded indebtedness and paid no return to its numerous stockholders, the real owners of the property.

Company Makes Novel Proposal

Then the president puts the matter up to Harry squarely: "If we are put out of business, then what? The city must have street cars; what assurance have you that a new company *can* do what we *cannot* do?"

"It is not a question of ability," retorts Harry, "it is a question of willingness. I am not a street railway man, but to be frank I think you are bluffing. If I had charge of your company for a month I would show you how to give real service." And Harry bangs his fist emphasizingly on the desk.

For a moment the president looks at Harry thoughtfully. From past experience he knows that Harry is wholeheartedly interested in the welfare of the city; that he is a young man of sincerity and moral integrity. Moreover, the president has uppermost in his mind the knowledge that Harry probably has it in his power to oust the company.

"Very well," begins the president slowly, "maybe you are right, although I don't think so, but I'll put you in as general manager with absolute authority. You can employ whatever help you need."

Harry's eyes open in astonishment at the unexpected proposition and he is on the verge of refusing, when the thought occurs to him that perhaps the interest of the citizens can best be served by accepting the offer. For several moments he sits thinking. Then he recalls an intimate friend who is a street railway engineer of considerable experience, whose asistance he could probably enlist.

"All right, I'll take the job," exclaims Harry. "First of all, I'm going to have a valuation made of the entire line; I want to see how much watered stock you have."

The president smilingly agrees: "Go as far as you like, you are in absolute control."

Harry Becomes General Manager

Fortunately Harry is able to secure the assistance of his friend the engineer, a thoroughly competent man, who immediately takes active charge. A valuation of the company's property is immediately started, together with an examination of its books.

All this occurs while "Boss" Bailey is temporarily absent from the city. When he returns and learns the situation he is wild with rage. Rushing over to Harry's office, he angrily demands that Harry's plan be dropped and the ouster suit instituted. But Harry, convinced that he is working for the welfare of the city, refuses. A heated discussion follows, the "Boss" craftily concealing his real reason for wanting the company ousted. But the "Boss'" efforts fail, despite a veiled threat that inasmuch as Harry's term of office is about to expire, if Harry wants to be re-elected, he had better "watch his step." But Harry refuses to be swerved from his purpose and the Boss leaves, wild with rage.

With enthusiastic determination Harry takes up his task. First he turns his attention to the matter of improving the service. In order to secure first-hand knowledge of the actual conditions he goes incognito to a busy section of the city at the rush hour. "First-hand knowledge" he certainly secures, as he watches the shoving, jostling crowd struggle to board the crowded, antiquated cars. Suddenly Harry is horrified to see a girl, shoved by the crowd, slip and fall under a moving car. Leaping forward, he grabs her by the arm and drags her to safety by a fraction of a second. The girl thanks him as much as her shattered nerves will permit, and then gets on the next car and, with a good-by smile to Harry, is gone.

A survey of various sections of the city discloses the same condition everywhere—a woeful lack of cars to handle the traffic. A trip to the carhouses shows that all available cars are in use. There is but one answer—more cars must be purchased—up-to-date, *high-speed* cars which will handle the traffic.

His Eyes Opened to Railway Problems

The following day he sees the other side of the problem. Visiting the carhouse during the dull hours he finds hundreds of cars standing idle, useless, with conductors and motormen likewise idle, drawing their pay while waiting for the rush hours. Even the cars that are running during the dull hours are carrying comparatively few passengers. And then Harry begins to realize some of the problems with which the street railway companies have to contend.

He then investigates the problem of unregulated jitney competition, which his friend the engineer explains can be combated successfully only by new safety cars and frequent headway—involving another expenditure of money.

And so the investigation continues—roadbeds, repair shops, etc., all with the same result. The irrefutable necessity for an increased revenue—*more money*.

Harry then turns his attention to the possibility of reducing operating expenses. An attempt to cut down the men's wages results in a threat of a strike (or perhaps an actual strike). He likewise finds it is impossible to cut down any other items of expense.

Throughout all this investigation Harry has a vague, unexplainable hope that he will again see the nameless girl whom he saved, but never a glimpse of her does he catch.

Harry Meets With Another Surprise

About this time the valuation is completed and Harry eagerly glances at the figure. To his surprise he finds that the company, as the president asserted, has been earning less than 1 per cent on the actual present-day valuation—that there is no watered stock.

Harry and his engineer friend have a long talk. Coolly they analyze the situation. The facts are clear; it is absolutely impossible to give satisfactory service with the present equipment. New, up-to-date cars must be purchased.

"Fortunately, conditions are such that we can use safety cars," states the engineer. "In some localities they cannot be used." Then we dissolve into a series of views showing the operations and advantages of the new type safety car.

"The entire system must be put in first class condition," concludes the engineer, "and all this requires money—the very thing the railway company hasn't got."

He Seeks Aid of Friend Banker

The only solution seems to be to make a loan, and accordingly Harry calls on a banker friend. To his surprise the banker positively refuses to loan the railway company any money.

"Its income is not sufficient to justify it," explains the banker. "I would be criminally negligent to my depositors if I were to loan money to a concern which is earning less than 1 per cent on its investment."

And then the banker goes on to add that big investors, such as insurance companies, savings banks, trust companies, etc., are fighting shy of street railway securities for the reason that in the past they have invested large sums in this class of securities and have received meager or no returns on their money.

Still unconvinced, Harry tries to interest some local investors in the proposition, but they ridicule the idea of investing in a concern which is paying no dividends and is on the verge of bankruptcy. They likewise call Harry's attention to the Federal Electric Railways Commission report that on July 1, 1920, there were 118 companies, with a trackage of nearly 8,000 miles, in receivership.

The Attorney Realizes His Mistake

Harry and his engineer friend have another long conference. Both agree that it is absolutely impossible to improve the service under present conditions.

Accordingly on the following morning Harry calls once more on the president of the street railway company, apologizes for his former criticism, frankly says that he was mistaken; that he and his experts have been unable to work out any betterment of the service; that nothing can be done with the present equipment, and Harry frankly admits that the only solution is an increase in fare, which he promises to use his efforts to assist in securing.

"Boss" Bailey is furious when he hears of this and tells Harry that unless he withdraws from his idiotic position and starts ouster proceedings he will kill Harry politically, to which Harry retorts that he will run independently for prosecuting attorney, while "Boss" Bailey puts up another of his men, Dugan.

Harry Defies the "Boss"

The issue is sharply drawn. Dugan and his crowd stand for ousting the company; Harry and the other independent candidates stand for an improved car service, with new, up-to-date safety cars, fast service, comfort, convenience, safety, extensions, and with necessarily a slight increase in fares, which will be returned many times over in the increased prosperity not only of the community generally but of the individual citizens, to say nothing of their comfort, convenience and safety. Harry makes an aggressive, energetic campaign and wins many adherents to his already considerable following.

As the election approaches, despite the inherent handicap of Harry's platform, which of course advocates an increase of fare, he gains so many new friends that "Boss" Bailey becomes alarmed and calling together his henchmen he plans by hook or crook to insure Harry's defeat.

The Boss Resorts to Trickery

As a result the day before the election, on the front page of "Boss" Bailey's newspaper, there appears, in red headlines, "Reason for Carson's Friendship for Railway Company Revealed."

Then follows what purports to be a statement of one John Baker that Carson has admitted to him that he was "getting his" from the railway company, together with other insinuations to the effect that Harry had been bribed by the transportation company.

When Harry's wrath over the false accusation has cooled he racks his brain for a means to counteract the effect of the newspaper statement. The only solution seems to be to get hold of John Baker, whom Harry knows to be a tool of "Boss" Bailey, and in some way force Baker to admit that his charge is false. A search is instituted for Baker, but the latter is not to be found.

The possibility of Baker being concealed in "Boss" Bailey's office suggests itself to Harry, likewise the possibility of Harry being able in some way to secure some information from "Boss" Bailey as to the whereabouts of Baker. Over to Bailey's office Harry rushes. And then, as he opens the door into the outer office, he stares in surprise, for at a typewriter sits the girl of his dreams—the girl for whom he has been searching—the girl whom he had saved from the car.

Enter the Heroine

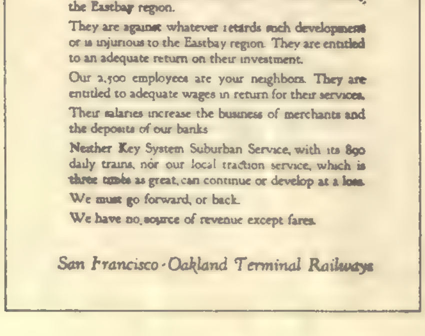
With a smile of delight Betty (for such is her name) comes to meet Harry, and Harry is so pleased that he almost forgets his mission and Betty is just as glad to see him.

But the "Boss" absolutely refuses to see Harry, and Harry is in despair when Betty (into whose sympathetic ear Harry has explained the situation) suddenly recalls having heard the "Boss" and his men mention the "Wayside Inn," a notorious roadhouse.

Two minutes later Harry is in a high-powered motor racing toward the "Wayside Inn" Arriving at the roadhouse, he secures admission secretly through a window.

After a desperate fight with a guard. Harry finds his man, who, terrified, makes a complete confession, including full details of "Boss" Bailey's plans and activities.

How the San Francisco-Oakland Terminal Railway Is Trying to Tell Some Homely Truths About the Intricacies, Detail and Size of the Local Railway Business



HOME-GROWN SERVICE

Eighty per cent of the 6,000 security holders of the Key System live within 50 miles of the Oakland City Hall.

All have other interests in the Eastbay cities.

They are for every just enterprise that will develop the Eastbay region.

They are against whatever retards such development or is injurious to the Eastbay region. They are entitled to an adequate return on their investment.

Our 2,500 employees are your neighbors. They are entitled to adequate wages in return for their services.

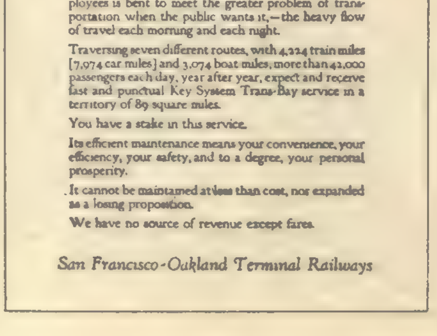
Their salaries increase the business of merchants and the deposits of our banks

Neither Key System Suburban Service, with its 890 daily trains, nor our local traction service, which is three times as great, can continue or develop at a loss.

We must go forward, or back.

We have no source of revenue except fares.

San Francisco-Oakland Terminal Railways



Two Million Dollars on Wheels

In each 24 hours 636 trains arrive and leave Key Pier,—

It's an average of about one train every two minutes, day and night.

But they don't run that way.

All the experience and skill of 2,500 officers and employees is bent to meet the greater problem of transportation when the public wants it,—the heavy flow of travel each morning and each night.

Traversing seven different routes, with 4,224 train miles [7,974 car miles] and 3,074 boat miles, more than 42,000 passengers each day, year after year, expect and receive fast and punctual Key System Trans-Bay service in a territory of 89 square miles.

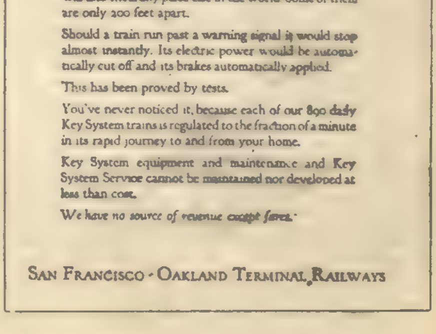
You have a stake in this service.

Its efficient maintenance means your convenience, your efficiency, your safety, and to a degree, your personal prosperity.

It cannot be maintained at less than cost, nor expanded as a losing proposition.

We have no source of revenue except fares.

San Francisco-Oakland Terminal Railways



"If Anything Should Happen to the Motorman"

We've thought of that too, and this is one thing we've done:—

We've built safety devices closer together than you will find them any place else in the world. Some of them are only 200 feet apart.

Should a train run past a warning signal it would stop almost instantly. Its electric power would be automatically cut off and its brakes automatically applied.

This has been proved by tests.

You've never noticed it, because each of our 890 daily Key System trains is regulated to the fraction of a minute in its rapid journey to and from your home.

Key System equipment and maintenance and Key System Service cannot be maintained nor developed at less than cost.

We have no source of revenue except fares.

SAN FRANCISCO-OAKLAND TERMINAL RAILWAYS

Politicians' Plot Exposed

Harry rushes Baker to the evening newspaper offices, where the confession is repeated, and soon thereafter the evening papers are carrying the message to the voters that John Baker admits his statement about Carson is false and was made up at the instigation of Bailey and his candidate Dugan, who are planning to oust the street railway company in order to start another company with a handsome financial profit to themselves.

Baker likewise adds the interesting information that "Boss" Bailey has frequently admitted that he knows that street car service cannot be given for a 5-cent fare, but that it makes good political talk—and "to hell with the public."

The People's Verdict

Naturally the voters are wild with indignation at the "Boss" and his crooked gang, and the following day there is such a revulsion of sentiment that Harry and the rest of the independent ticket are elected.

The inceased rates are speedily put into effect, and the company, being able to secure financial assistance, does its part nobly. The lines are rehabilitated, new modern safety cars are installed and the citizens have a transportation system of which they are justly proud. This situation will all be shown in actual scenes which will vividly contrast with the former wretched service under the inadequate 5-cent fare.

And our picture closes with Harry and Betty taking a ride in one of the new safety cars, their action indicating that their friendship is rapidly developing into mutual affection.

Scenario Suggestion No. 2

The writer of this scenario makes a preliminary statement to the effect that the object of the story is to show the complete dependence of the public on street car systems. This is accomplished by weaving in with the story the Toledo incident of stopping transportation by removing the cars out of the jurisdiction of the city and state authorities. In the adjustment which follows the street railways have an opportunity to present their side of the case and make the people themselves the jury which shall decide the outcome, once they thoroughly understand the situation. The action of the story makes this possible in a natural manner in the working out of the Mayor's "back-to-the-land" idea, by which he hopes to mitigate the crime wave which is sweeping the city. The synopsis of the story to carry out this intent follows:

John Dayton lives with his daughter, Helen (a pretty girl of 20), in a mountainous district a few miles from the nearby city. Dayton owns coal property for which he has tried in vain to get capital to develop. Being far removed from the lines of transportation, he finds it impossible to get the necessary funds to promote it or men to work it. Years of experience in mining makes him confident that the stuff is there and he plugs away in the hope that he will some day succeed in getting it developed.

Helen sympathizes with the old miner, whose life work is tied up in this property. There is a strong bond of affection and understanding between them and her convictions that he will some day succeed give the old man courage to go on.

A Man with a Big Idea

In the nearby city a great wave of crime among the young boys has swept over the community, and ex-Judge Hanlon of the Juvenile Court has been nominated on the reform ticket. His years of work among the boys and girls of the court has convinced him that in order to accomplish any lasting good the youth of the country must be saved from the pernicious influences which have bred such an alarming number of criminals among the young boys.

He bases his hope of reform on the "back-to-nature" idea, to take the children away from the congestion of a big city, to encourage the parents to acquire homes in the suburbs and give their families an opportunity to grow up under the influence of the green grass and blue sky. He knows it is difficult for any one, much less a child, to grow evil when living close to the heart of nature.

Hanlon has a gigantic task before him To accomplish this end it is necessary to have the street railway system extended in every direction. But there has been a long fight on between the street car corporation and the people. However, Hanlon is young and enthusiastic and refuses to recognize any obstacle to his plan.

Railway Forced to Drastic Action

Meantime the fight has resulted in the street railways giving an ultimatum to the Aldermen of the city, who have recently recalled a franchise they promised. The company officials threaten to stop transportation. The Aldermen defy them, not believing they dare. The city is near the state line; by the next morning every car belonging to the company has been transferred across the line and out of the jurisdiction of the state officials.

There is consternation everywhere as the city wakes up to face a general tie-up of the traffic. As the workers are compelled to use the totally inadequate jitneys and every available vehicle they can muster, or walk, they suddenly have a bitter realization of the value of a utility which until now had seemed as much a part of their everyday life as light or food or air.

Angry Mob Threatens

A mob (ignorant of the action of the company in removing the cars) gathers outside the carhouses, threatens to storm the place and run the cars by force. The carhouses are opened to show vast empty spaces where formerly the cars had stood.

Such is the condition which confronts Hanlon on his first day in office. He goes in person to the president of the street railways to force him, if necessary, to put the cars in operation. He finds the cars have been removed from his jurisdiction and there is nothing to be done by means of coercion.

The situation results in a conference between the Mayor and the president, which gives the street car company an opportunity to present its side of the case in a natural manner. The president appeals to Hanlon's sense of fair play, which is in reality the people's sense of justice. He reminds the Mayor that he wants the street railways extended to carry out his "back-to-the-land" idea and to develop the surrounding country, which extension is impossible at the present rate of fare.

To Rid the City of Crime

Hanlon is open-minded and both sides of the question are brought out, apparently with a view of furthering Hanlon's official ambition to rid the city of the crime wave, which can be done only with the co-operation of the street railway company.

In order that the conference will not be too continuous there is shown as parallel action the condition of the city during the absence of transportation. Part of the propaganda is put into the mouths of the people themselves. For instance: A workman waiting in vain for a jitney complains that every half hour he loses costs him 50 cents. A superintendent waiting at the same corner admits that every hour he loses costs the company hundreds of dollars in the loss of time of its men, and the individual losses are made the basis for pointing out the loss to the entire city.

Not a Soulless Corporation

Meantime the conference is going on. The street railway's president makes Hanlon understand the vast capital involved, the number of small investors who must be protected; that he is not dealing with a soulless corporation, but with every working man or woman or widow who has stock in this great interlocking system of transportation. He points out the small amount of each dollar which actually goes to the investors This is accomplished by means of a diagram, which divides the dollar up into proportionate shares, showing so much to the city for franchises, so much to the employees, so much for overhead, for accidents, deterioration, etc. In this division of the dollar the audience learns through the eyes what a small slice actually is left for the man who risks his money.

The picture will show that a utility belongs to those who make use of it. The film will also bring out the thought that the system of transportation will carry a man from 1 mile to 10 for 6 or 7 cents, while the automobile owner with capital invested in his machine, with the added cost of upkeep, pays more than double the amount for gas alone for the same distance. The street car system belongs to the people of moderate means. The electric railways are the capillaries of the body politic, without which it cannot exist.

Public Ownership vs. Adequate Fares

In conclusion the president points out two courses: One is to allow the trolley company an equitable rate of fare which will pay the investors a fair rate of interest (under public regulations of the utilities board there is no longer a chance for larger profits), the other is for the city to buy the electric railway system, run it as a municipal utility, bear the deficit which the present rate of fare entails and make it up in added taxes, same as with the parks, water system, etc.

The latter proposition may seem to the audience at first sight like a solution of the problem. The Mayor explains, however, that no American city of the size has thirty millions of dollars to put into such a utility and run it at a loss; that it would mean an addition of $50 per capita in taxation, besides plunging the city almost hopelessly in debt for the initial expenditure.

The two men are at a deadlock in the conference. The president finally declares that if the people themselves once really understood the situation, if they would discount the ancient bunk of the professional politician, he would be willing to abide by their decision. He further points out that under municipal ownership the lines would be run by politicians instead of by trained experts who know their jobs.

The conference results in a better understanding by the Mayor (and the audience) and he agrees to use his influence to bring about an understanding between the railways and the public.

An Unexpected Caller

Helen Dayton, in her father's little cabin in the mountains, reads of the aims and principles of the new Mayor, his "back-to-the-land" idea and his hope of having the street railways extended. Unknown to her father, she visits the Mayor's office in the hope of getting the car lines extended so that her father's mine may be developed.

In spite of the Mayor's political success he is young enough to be impressionable, and right here the little God of Romance gets on the job. The girl is earnestly explaining the possibilities of the coal mine. Hanlon looks deep into her eyes—"Did you say diamond mines?" he asks absently

When the thread of the story is again taken up the extension of the car lines has been made and what was formerly great stretches of weed-grown land around straggly suburbs has now become a newly built up part of the city which the street car system has brought to its doors.

Becomes a Valued Assistant

The girl has become interested in the Mayor's theory of helping the youth of the city and is now an ardent worker in the congested districts. The people have confidence in Hanlon because he holds out a means to them of helping themselves, and hundreds of workingmen's families who had huddled in the tenements from force of habit now join the exodus to the suburbs so their families may grow up, free from the pernicious influence of the streets. Truck gardens spring up, production increases, the living problem becomes less acute, and the family life which the suburban home engenders bids well for the success of Hanlon's work among the boys

The new street car system brings John Dayton's mine within easy reach of the city and he is able to secure the long sought for capital for its promotion. The successful development of the mine causes a thriving mining town to spring up and the hitherto well-nigh valueless property becomes the center of bustling activity.

Happiness and Prosperity

Meanwhile, the romance betwen Hanlon and the girl has developed as rapidly as the other activities (also owing to the street car system), and when the little God of Romance sees the ring safely on her finger he lays aside his quiver with a satisfied smile.

The final conclusion is obvious: The people need the big industries as much as the industries require the support of the people. One cannot exist without the other, and it is only through intelligent co-operation that any lasting adjustment of their differences can be accomplished.

Appeal to Business Men

The British Columbia Electric Railway, Vancouver, Points Out How Revived Utility Would Stimulate Trade

THE British Columbia Electric Railway has recently addressed the business men of British Columbia on the advantages of a liberal policy to the utilities. A copy was included of the resolution on utilities adopted at the last annual meeting of the Investment Bankers' Association of America and printed on page 935 of the issue of this paper for Oct. 30. The letter itself, which is signed by the British Columbia Electric Railway, is printed, in part, below:

To THE BUSINESS MEN OF BRITISH COLUMBIA:

One six-billion-dollar industry with a purchasing power of between $600,000,000 and $700,000,000 a year is virtually out of the buying market.

Another five-billion-dollar industry which ought to spend $750,000,000 a year has its purchasing power greatly curtailed.

Business is losing these orders.

The industries are the electric railways and the electric light and power systems of this continent. Their credit largely gone, unable to raise new capital, these public utilities have stopped growing. They are out of the market for anything but essential maintenance supplies. Except in a few cases where fair rates and fair treatment have been accorded them, expansion has ceased and business generally has been deprived of a customer.

The electrical utilities would again be in the market for supplies for new power plant equipment, wire, rails, ties and other materials, but they cannot attract capital because they have been unable to make a fair return on capital previously invested. Public distrust and antagonism have made public utility securities too risky for investment today, especially when government and other gilt-edged securities are offering 8 per cent interest.

With their purchasing powers restored, public utilities would place more orders for supplies. The expansion of their facilities would mean expansion of other industries dependent upon electric power and transportation. More people would be employed directly or indirectly in Vancouver and their purchasing power would have its effect upon your receipts.

Purchases made by the British Columbia Electric Railway Company for current supplies at present amount to approximately $1,250,000 a year. One California company is starting upon a program of development which requires an expenditure for new construction of a million dollars a month for fifteen years, provided funds can be obtained. Construction work by our company would mean millions of dollars in increased business to local firms.

The annual payroll of this company exceeds $4,000,000 a year. The major portion is spent immediately upon the every-day requirements of life. Every merchant directly or indirectly obtains some of this $4,000,000. Similarly a large part of any construction work would mean wages which would be added to this total.

Do you realize how your interests are affected by the financial condition of your public utilities and how your business will suffer by the inability of your public utilities to attract new capital? Other businesses, realizing that the public utilities' interests are their interests, are actively taking up the case of the street railway and lighting company against public antagonism.

It is good business for them. Why not for you?

Novel Publicity Pamphlet by Bankers

FROM time to time it has been suggested that the banker, who has in the past recommended the purchase of public utility securities, should now appear in public and aid the security holders in telling the actual state of affairs of the utilities so that the public may know. This program was urged by several of the state railway and utility commissioners in their convention at Washington recently, for, they said, the banker has the confidence of the community and he can make people appreciate the relation of the welfare of the community to the welfare of the utilities which serve it.

In apparent recognition of this sense of duty and opportunity for public service, one of the Seattle banks has recently put out the following article in unique wording in pamphlet form:

The Chariots that Run Through the Streets

FOR behold the city of Seattle flourished and the number of its inhabitants was very great.

And the inhabitants of the City were wont to go about the City in Chariots, called street cars, which were possessed by the Puget Sound Traction, Light & Power Company.

Moreover the people paid a fare to the Company for riding in its Chariots.

And it came to pass that the people sought to purchase for their own possession the Chariots which ran through the streets, for they were displeased with the Company. And a certain agreement was made between the City and the Company whereby the City did purchase the Chariots, agreeing to pay therefor so much, and bonded itself to make certain payments. And when the City had possessed itself of the Chariots for a season, there were serious murmurings among the people.

And some said the possession of the Chariots was proving a curse.

And much criticism was heard and some even said concerning the Chariots that the people's last state was worse than their first.

Now there was a certain man named Mayor Caldwell, a ruler of the Seattleites, and when he had reigned *two hundred and five days* he divined that the Chariots which the City had bartered for and purchased, even the Chariots which ran through the streets of the City, were profiting the city nothing, but were a great burden upon the whole people.

And behold in the tenth month on the fifth day of the month of the first year of his reign, being the year nineteen hundred and twenty, Caldwell arose before the multitude gathered together at the Municipal League and cried with a loud voice saying:

"Wot ye not, my people, that it is a human impossibility for the City successfully to navigate the fatuous course we are now embarked upon. . . and I have no hesitation in saying to you it cannot be done."

And he brought forth figures to show the children of Seattle that the Chariots were profiting them nothing and there were none to say where-with-all the payments for the Chariots which were promised could be made, nor yet could it be discerned how the City could with honor escape the payments according to the agreement into which it had entered with those who beforehand had owned the Chariots.

And when the news was spread abroad among the people, many there were who heard and believed the words of the Ruler and marveled that their eyes, and the eyes of the people had not been opened and their understanding enlightened before they took possession of the Chariots.

And they spake among themselves saying, "Is it not so that they that beforehand possessed the Chariots, even the Traction Company, suffered greater burdens than we have suffered; verily were they not taxed, also required to pay a tribute of 2 per cent of gross earnings which we have escaped, and yet we being relieved of the taxes and tribute and having increased fares are yet unable to make profit?"

And the people remembered that the Traction Company in times past had complained bitterly and were sore distressed, but none was there to offer them succor.

Moreover they remembered that the councilors of the Seattleites and those in authority showed no mercy, refusing to grant its petition for increased fares or to offer other relief.

And the people began to be awakened and many false doctrines were preached.

Also men in authority sought to fasten each upon the other blame for the troubles that beset the City by reason of their desire to secure unto themselves the Chariots.

For they were loath to confess that their undertaking had come to nought, not-withstanding that the record of other Cities showed that Cities profit not by the possession of the Chariots that run through the streets. —*Relgnaps*

Aligning Trolley Wire on Curves

THE Northampton Traction Company of Easton, Pennsylvania, has a number of curves on its lines where the pole lines are on the inside of the curve. In order to line up the trolley wire with the track, a special type of construction, consisting of "push-overs" with pole brackets, was devised by Edward Welch, line foreman of this railway, and is shown in an accompanying illustration. Pole brackets are installed at their usual location on the poles, and between these from one to two push-overs are used in each section. A guide wire is strung along the inside of the poles to which the inside ends of the push-overs are fastened. The length and spacing of the pushovers is adjusted to meet conditions, so that the trolley wire will line up with the track. This road has a number of curves with this type of construction which have been in service for between six and seven years with satisfaction and its use has saved the expense of installing a pole line on the outside of these curves.

TRACK CURVE WITH INSIDE POLE LINE

New Line of Insulated Tapes

TAPES of various kinds have been used for insulation purposes for a long time because of their facility of application to irregular shapes of coils, cores, etc., upon which it would be difficult to place insulation in sheet form. These tapes are either woven from fibrous materials, and are known in such case as stays, or webbings, or they may be cut from treated or untreated fabrics.

The General Electric Company will soon place on the market a complete line of such tapes, including several varieties cut from black or yellow varnished or oiled cloth which are adaptable for winding armature or field coils, transformer coils, etc. The ordinary white cotton tape has selvedged edges, an open structure, smooth surface, and medium strength, and may be used to tape armature coils to form a basis for varnish. Asbestos tape contains a small percentage of cotton to facilitate the spinning of the yarn and is adaptable for use on windings where heat-enduring insulation is required.

Another class of tapes is what is known as friction, or splicing tapes, generally used to cover joints which are exposed during splicing or connecting of conductors. One type, known as splicing gum, is an all-rubber compound containing no cloth and made from fine para rubber. At ordinary temperatures the heat of the hand is sufficient to cause the tape to unite, forming a solid, water-tight joint. Gum-faced tape is made of a layer of 98 per cent pure rubber on a backing of unvulcanized high-grade rubber compound containing only fine para. It is valuable for taping joints on underground rubber-covered cables or other places where high insulation and tightness against water is necessary. Joints made from this tape may be vulcanized if desired. Temporary binding tapes, or friction tapes, are made of an unbleached cotton cloth, coated and filled with either black asphalt, or rubber compounds. They are slightly adhesive at room temperatures and form temporary bindings for ordinary purposes.

Largest Circuit Breakers to Be Installed in Hell Gate Station

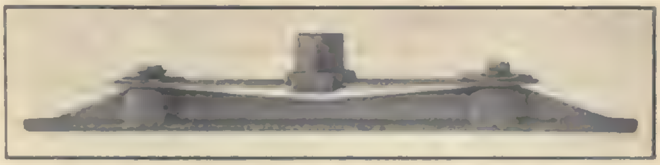
THE heaviest circuit breakers ever designed for 13,200-volt service will be installed by the United Electric Light & Power Company, New York, in its Hell Gate Station, which supplies power to the New York Connecting Railroad. There will be 120 of these solenoid-operated type "04" Westinghouse circuit breakers, having an interrupting ability of 58,000 amp. at the arc (1,500,000 kva). The disconnecting switches are gang-operated and their operating mechanisms are interlocked with the oil-breaker mechanism so that the disconnects cannot be moved unless the breaker is not in operating position, thus assuring safety to operators.

These oil-breakers are unique in that the phase elements will be in separate rooms, approximately 30 ft. apart, with the operating mechanism on the floor above, thereby preventing the possibility of a bus bar short circuit and minimizing the effects of a ground.

Flexible Spring Trolley Ear

THE Drew Electric & Manufacturing Company, Cleveland, Ohio, is manufacturing a new trolley ear, especially adapted to viaduct, tunnel and bridge work, as it is so constructed that it offers a flexible path to the trolley wheel passing over it. This is desirable for this class of service, since due to the small overhead clearance the trolley pole is usually forced down under the highest tension when crossing a bridge or passing through a viaduct or a tunnel.

The ear proper is 15¾ in. long and is suspended from a spring by two bosses 9 in. apart. The spring is 1¼ in. wide and made of No. 14 gage steel. A slot in the spring at one point permits a lateral movement which gives flexibility when the trolley wheel strikes the ear. The entire ear is suspended by a boss, which screws on to any standard hanger. The base of this boss is corrugated to make a positive lock when it is screwed tight against a washer. The ear can be readily taken apart and the spring and boss used again after the contact part wears out.



FLEXIBLE SPRING TROLLEY EAR

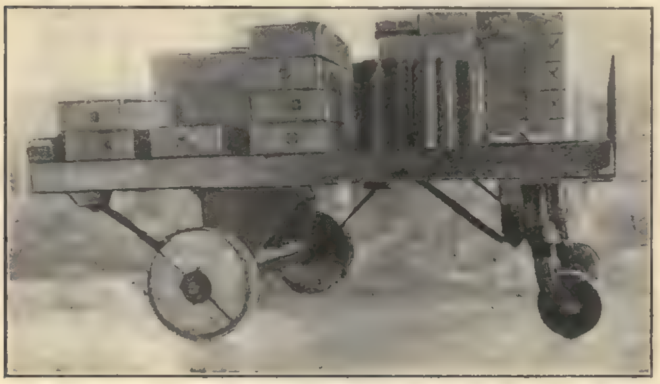
Wooden Wheels Eliminate Noise

By Clifford A. Elliott
Cost Engineer Pacific Electric Railway

THE Pacific Electric Railway recently placed in operation its new store at Torrance in conjunction with the recently completed shops. It was soon found that the warehouse trucks, equipped with cast-iron wheels, when rolled over concrete floors caused too great annoyance to the office forces. It was almost impossible to carry on a conversation in the office. Patent rubber-tired iron wheels not being available locally, wooden wheels were substituted for the excessively noisy cast-iron ones.

ORDINARY HAND TRUCK EQUIPPED WITH WOODEN WHEELS

These wooden wheels, of the same dimensions as those discarded, were made from A-1 select maple lumber in the company's wood mill. A wheel 6 in. in diameter and 2 in. deep was used on the ordinary two-wheel truck. For the 3-ft. x 5-ft. platform warehouse truck rear wheels 12 in. in diameter and 2 in. in thickness were made. The casters in front were replaced by 6-in. wooden wheels. Excellent life is being obtained from these practically noiseless wooden wheels. Although not intentional, the substitution of these new wheels will result in considerable economy over rubber-tired trucks, the tires of which have already given evidence of needing early replacement.


WAREHOUSE PLATFORM TRUCK CONVERTED FOR NOISELESS OPERATION

Mechanical Properties of Turbine Steel

AT THE British Electrical and Allied Manufacturers' Association it was decided to conduct investigations to determine what auxiliary tests might usefully be added to the specifications for turbine steel as a supplement to existing information. Practically all commercial tests were performed on two turbine disks and two shafts forged by three large producers, besides an exhaustive examination of the composition, microstructures and mechanical properties. The forgings were placed in service and at some future time their performance will be compared with that indicated by the test.

A second course of tests was conducted on specimens which had been successful and unsuccessful in service to determine how much the metal under examination was affected by usage. The general conclusions reached indicate that the various mechanical tests performed displayed quite accurately the properties of commercial forgings, although the effect of varying amounts of forgings on the characteristics is not yet sufficiently defined. The tests generally indicate that commercial forgings are of moderately good quality, but that the qualities which can be induced in small masses are not obtained, nor are they to be expected, in large masses. That design may be a factor of greater importance than the quality of the steel is suggested by the fact that similar steel has given good results in some turbines while not in others. It can safely be said, because of the various tests on forgings, that the tensile test gives a good indication of the quality of the material, though perhaps not sufficient for absolute reliance. The difference between ductibility longitudinally and transversely is generally shown in the value for elongation or reduction in area, while the maximum stress indicates hardness.

Association News

Hotel Arrangements for Meeting

SECRETARY BURRITT of the American Electric Railway Association announces that arrangements have been made with the Drake Hotel in Chicago to reserve a number of rooms for delegates to the midyear meeting of the Association. This meeting, as published last week, will be held on Feb. 10 in Chicago, with headquarters at the Drake Hotel, which is located at the corner of Michigan Avenue and Lake Shore Drive, or about a mile from the Blackstone Hotel. Although the Drake Hotel has 800 rooms, hotel accommodations in Chicago during the winter are at a premium, and those who expect to attend this meeting from out of town are urged to make reservations early.

The prices for the accommodations vary from single room with bath when occupied by one person, which is from $6 to $8 a day, to a double room with bath, when occupied by two persons, which is from $8 to $14 per day.

For the banquet of the association in the evening, the sub-committee on hotel arrangements has reserved the main restaurant and Avenue of Palms in the Drake Hotel. This restaurant will seat 1,500 persons. The program for the technical sessions during the day and the banquet in the evening will probably be made public next week.

November Bulletins Now Available

THE following list of compilations and reports has been prepared by the Bureau of Information and Service during the month of November and is available to member companies upon request:

Wages of Employees in General Maintenance and Operating Departments. Based on replies to general letter sent to member companies.

Recent Official Valuations. Based on decisions of Public Service Commissions during the last year.

List of Companies Receiving Relief from Paving Requirements. This includes special exemptions allowed companies under existing franchises and also the limited requirements provided under new franchises including service at cost agreements.

Standard Blank Forms. Copies of existing forms used by companies in all departments will be loaned to member companies upon request. As the number of copies is limited members are requested to indicate only the departmental group desired and to return the forms at the earliest convenience.

In addition supplements have been prepared to bulletins on subjects of wages of trainmen, cost of living, fares, and automobile accidents, bringing these up to Dec. 1.

Letter to the Editors

Trolley Versus Motor Truck for Freight Handling

EAST PITTSBURGH, PA., Nov. 27, 1920.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for Oct. 16, page 795, you printed an abstract of the address of George M. Graham, vice-president of the Pierce-Arrow Motor Car Company, presented at the Atlantic City convention.

After admitting that the motor vehicle cannot replace the street railways in the handling of passengers from either a service or an economy standpoint, Mr. Graham makes a number of assertions with reference to freight haulage on electric lines which might be taken by the casual reader as evidence that the electric line cannot successfully compete with the motor truck in the handling of freight.

While his statement is true that the income from freight handling represents only 9 per cent of the total revenue of electric lines now engaged in the transportation of commodities, it should be borne in mind that practically all interurban roads were originally planned and constructed for passenger service only and that they have hardly begun to develop their possibilities in the way of transporting freight.

By some method of analysis, the basis of which is not divulged, the conclusion is reached that in handling freight, the electric lines are "handicapped"; that "freight haulage is not their field"; that "electric lines should not figure too hopefully on freight revenues," and that "sound business would indicate the withdrawal of freight facilities where they cannot successfully compete with steam railways and motor trucks"; also that "in short distance transit of package shipments up to 100 miles they cannot compete with the motor truck."

None of these assertions is substantiated nor can they be reconciled with the facts. While it is true that the electric lines are handicapped in the handling of freight, this handicap consists principally in the lack of adequate terminal facilities and equipment, which could be secured with a much smaller investment than would be necessary to provide motor trucks to handle the same amount of tonnage. All who have studied the electric interurban railway situation agree that there are immense possibilities for freight handling; that this branch of service has hardly been touched, and that the actual results already obtained, even with inadequate equipment and facilities, more than justify the service in net financial results, and this from the transportation of goods distances of from 20 to 200 miles.

Statistics which have been gathered covering actual motor truck operation prove conclusively that motor trucks cannot be operated profitably, or with a reasonable return on the investment, for distances over 20 miles, even under ideal conditions as to weather and roads, if they charge on any basis less than American Railway Express rates. At a recent meeting of members of trucking associations, covering the states of New York, Massachusetts, Connecticut, Rhode Island and eastern Pennsylvania, and including several large trucking companies in New York, Boston and Philadelphia, this basis of rates was decided upon. This meeting also developed that trucking companies operating between New York and Boston found it unprofitable to haul by truck all the way, and they are now merely picking up or delivering shipments at either terminal and loading them into steam road freight cars to be forwarded each night as solid carload shipments and at the much lower freight rates, in order to secure quickest possible delivery and make their operations pay.

As against this, electric lines are handling freight at rates less than half of those charged by the American Railway Express Company and in most cases on a parity with steam road rates, and are rendering better and more dependable service than would be possible with trucks, with less liability of loss and damage, and assuming all the responsibilities that go with freight operation by a common carrier.

Mr. Graham cites the fact that the average revenue received by nine typical electric lines for transporting freight amounted to $4.89 per ton, or 94 cents per freight car-mile operated. What he failed to state was that the expense of handling this same tonnage was $3.462 per ton, or $0.5928 per freight car-mile, leaving a net profit of $1.428 per ton, or $0.3472 per car-mile, or, in other words, an amount equal to approximately 15 per cent on the investment for freight facilities and equipment used.

Truck operators in Middle Western states have also made a study of the cost of freight handling and have found that they must receive at least $1.25 per truck-mile for 5-ton trucks. Compare this with the average cost of $0.5928 per car-mile on electric railways, each car carrying from two to three times the tonnage of a motor truck.

Surely there is nothing in these figures which would warrant the statement that "sound business would indicate the withdrawal of freight facilities on trolley lines," or that they cannot successfully compete with motor trucks. There is no question but that the motor truck has its place in the transportation problems of the country and that it will continue to handle a large amount of tonnage, but in view of the facts it cannot be conceded that the motor truck is either more efficient or more economical than the electric railway. The greatest factor which has prevented electric lines from establishing or increasing freight service has been the lack of funds to provide the necessary equipment, terminals and other facilities. Recent developments, however, indicate that a brighter outlook and a more favorable consideration on the part of the investor are looked for in the marketing of electric line securities. With adequate facilities, it is not difficult to foresee gross freight revenues equaling if not exceeding passenger revenues and with much greater net returns per dollar of investment.

T. H. STOFFEL,

Vice-chairman 1920 Committee on Express and Freight Traffic Facilities and Costs, American Electric Railway Transportation & Traffic Association.

Recent Happenings in Great Britain

Tramway Employees Still Restive—Strike Narrowly Averted in Glasgow—London Council Raised Fares None Too Soon

From Our Regular Correspondent

The insatiable demands of tramway employees in Great Britain were continued in the end of October, when application was made for an increase in wages of 12s. a week for adults and 6s. for those under eighteen years of age. It was as recently as last spring that a large advance was granted. Following this tramway fares were further increased all over the country. The breaking point must soon be reached. The application came before a special meeting of the National Joint Council for the tramway industry on Oct. 26. The council consists of representatives of municipal tramways, company tramways, and employees.

THE companies cannot, like the municipalities, fall back on the rates to make good deficits. Accordingly it is not surprising that their representatives announced that they could not entertain the application. They thereupon retired from the meeting. Subsequently the representatives of the municipalities and of the employees agreed to institute an inquiry through their secretaries as to the increased wages and bonuses that have been received by the employees in comparison with the increased cost of living, the effect that the increased fares have had on the financial position of the tramway undertakings and the rates of wages paid to tramway employees as compared with those paid to other classes of labor in municipal undertakings. The result of the inquiry had not at the time of writing been made known.

WAGE INCREASE IN GLASGOW

A strike of all the employees of the Glasgow Corporation Tramways which was to have been declared on Oct. 22 was averted at the last moment by the corporation agreeing to grant an advance in wages of 4s. a week. The increase will add £60,000 a year to the expenses of the undertaking, so all calculations as to the financial results of the recent increase of fares are blown sky high. The fares in Glasgow, however, are still lower than the fares in many other towns, so a margin in that direction is still available. It has also to be said that tramway wages in Glasgow have been lower than in many of the large towns in England. Glasgow did not come within the national tramway wages scheme, but settled its own affairs.

I mentioned last month the dispute in the coal-mining industry. The negotiations which were in progress at the time of writing failed, and on Oct. 16 all the coal miners in the country went out on strike. Paralysis of other industries immediately began, coal was rationed, railway services and in some cases tramway services were reduced. Negotiations were resumed and on Oct. 28 an agreement was reached by the government, the coal owners and the miners' executives. Under this arrangement employers and employed are to use all possible means to increase output and the miners get the 2s. per shift increase which they demanded, but only for a short time. Thereafter for a time the wage is to be regulated in proportion as the profits of the industry rise above or fall below those of the September quarter. The owners' share of the profits is to vary correspondingly.

NATIONAL WAGE BOARD PROPOSED

A National Wages Board is to be set up and when it comes into being it will carry on future regulation of wages. District committees to promote output are to be formed. The executives of the Miners' Federation recommended the men to accept the scheme. A ballot was taken in the beginning of November. On Nov. 3 the result of the ballot was reported to the executives of the Miners' Federation. It was found that the number of votes for accepting the proposed terms was 338,045 and that the number against was 346,504. This gave a majority against of 8,459. The rules of the federation, however, provide that a national strike shall not be declared unless two-thirds of those voting decide in favor of such a strike, and similarly that when a ballot is taken during a strike a vote of two-thirds of those taking part in the ballot shall be necessary to continue the strike. As the two-thirds majority was not forthcoming the executives declared the strike at an end. Within a few days thereafter the men were back at work. The government at once canceled the temporary restriction orders on the use of coal, electricity and gas and the railway and tramway services were brought up to full pitch in the week beginning Nov. 7.

A novelty is being introduced in connection with the Bradford municipal tramways in the shape of a double-deck trackless electric car with the top deck inclosed—that is to say, it has a roof cover like many tramcars to protect the top-deck passengers from the weather. The vehicle seats fifty-one passengers. Hitherto such cars have been of the single-deck type, and there was not much encouragement to adopt the two-story vehicles, as permission to fit roof covers has been confined to tramcars.

TRACKLESS TROLLEY FAVORED

The want of a roof cover is one of the great drawbacks to the motor omnibus in London. The Ministry of Transport has, however, allowed it on these Bradford railless electric cars. Over the routes equipped for them there are of course two trolley wires and the cars have double trolleys, positive and negative. They are also adapted for running over overlapping stages of the tramway routes. When using the tramway overhead wire the negative trolley pole is pulled down and for the return circuit an iron shoe is fixed to the front of the car and runs in the groove of the rail. Of course no ground electric contact can be made by the wheels as they are rubber-tired. A considerable body of opinion in this country favors for routes of light traffic the railless electric car rather than the petrol omnibus.

The recent large increase of fares on the London County Council Tramways came none too soon to judge from a return issued for the six months ended Sept. 29 last, when the old fares were in force. The traffic receipts during that period were £2,224,522, while the expenses, including capital charges and half cost of renewals, were £2,594,800, showing a deficit of £370,278. Since the last increase in fares the receipts are showing increases of about 25 per cent over those of the corresponding weeks of 1919. How this will compare with present expenses remains to be seen.

It should be noted that under a recent arrangement with the government the London County Council has been permitted, in view of the exceptional position of the undertaking, to charge during the years 1919-20 and 1920-21 half the cost of renewals against capital, the money to be repayable in twelve years. The proportion of renewals expenditure chargeable to capital account for the year 1919-20 is £142,688 and for the following year £205,000.

ELECTRIFICATION PLAN REVIVED

It is announced that the Northeastern Railway intends next year to promote its scheme, foreshadowed some time ago, for the electrification of the main line from York to Newcastle-on-Tyne and of a line from Northallerton to Stockton-on-Tees. Evidently the recommendations of the government's advisory committee on railway electrification will be followed because it is proposed to use the third-rail system between stations and the overhead system at stations and busy junctions. Electric locomotives will also be used for shunting at important yards. The main line between York and Newcastle is part of the east coast route between London and Scotland over which some of the fastest trains in the country are operated.

There has been some talk here over the fact that the Partington Iron & Steel Company has placed an order valued at £200,000 with the Allgemeine Elektricitäts Gesellschaft, Berlin, for two 1,400-kw. generators and one 3,000-hp. motor for a rolling mill. It appears that the contract went abroad because the Partington company objected to the price adjustment clause now usual in British contracts, which provides for revision of the price in case of any alteration in the cost of materials or wages. The difference in price between the British and the German tenders was not great.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

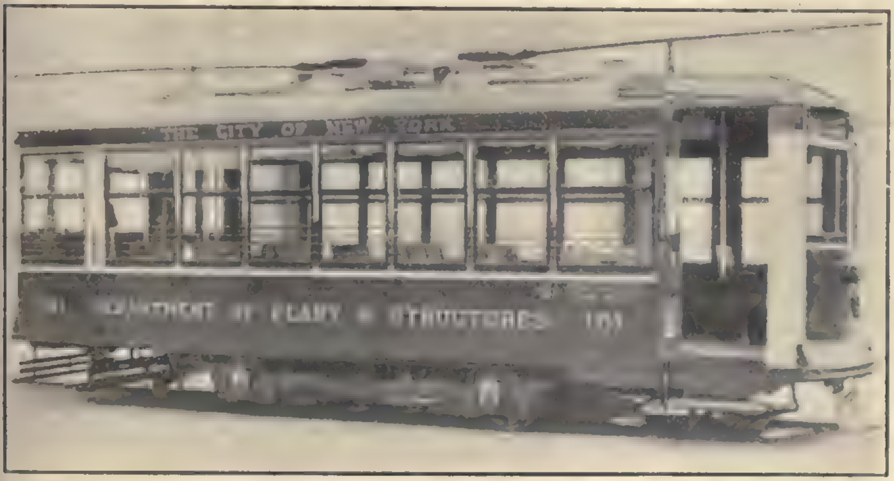
PERSONAL MENTION

Mayor Starts Road

New York Executive Ushers in Municipal Operation of Line on Staten Island

Dec. 1 was a big day on Staten Island. It marked the restoration under city auspices of service on the Midland Railroad, suspended since last January. All was not gladness, however. It is true that a little girl did kiss Mayor Hylan, but then the municipal ferry boat wending its way from Manhattan to the Island and carrying the city celebrities got lost in the fog and delayed the ceremonies.

The line as restored to service runs from Concord to St. George. The Mayor acted as motorman of the first car. The city's chief executive is an old hand at this work. He was once a locomotive engineer on the elevated railroad in Brooklyn. Anyway, those who saw him guide the car over the Staten Island hills agreed that this was a job he handled as if he really knew all about it. Out on the front platform of the car hung a big floral horseshoe, wishing success to the municipal undertaking.



UP-TO-DATE EQUIPMENT FOR CITY LINE

At the carhouse at Concord the Mayor again was much in evidence. Here he raised the flag of the city over the building to the strains of music by the Street Cleaning Department Band.

But this isn't all. Aside from the formal ceremonies at which the Mayor was kissed there were big doings at St. George, the terminal of the municipal ferry. There the Mayor spoke while a banner fluttered in the fog bearing the inscription "Thanks to Whalen for the Nickel Trolley." The Mayor was introduced as "the most honest, fearless and able executive of the greatest city on earth." He quickly warmed to his favorite subject, "The Traction Trust." The movement of the robber barons of the traction world in New York for an increased fare had its inception on Staten Island, but instead of a fare increase the people now had a municipally-operated line run at a 5-cent fare. Of course, the Mayor was renominated by acclaim by those who listened to him, but he modestly said he had enough.

The lines to be operated are from St. George to Richmond, St. George to Concord, St. George to Port Richmond via Concord, St. George to Port Richmond via Silver Lake, Manor Road, Richmond Terrace, and Clove Road and West New Brighton to Four Corners. A shuttle will operate between Grant City and Midland Beach. The cars to Richmond and Port Richmond will run on a fifteen-minute schedule to meet the ferry boats. The Concord line will have a ten-minute schedule.

Twenty-eight cars were ordered from the J. G. Brill Company. They are the standard-design safety car. The fare will be 5 cents. Special school tickets will be issued to children.

Franchise Forfeit Enjoined

Judge Sater in the United States District Court at Columbus, Ohio, has denied the petition of the city of Martins Ferry, Ohio, for a permanent injunction against the Wheeling (W. Va.) Traction Company. In June last the Martins Ferry City Council passed an ordinance revoking all rights of the company and ordering it to remove rails, wires and poles from the streets. Judge Sater ruled that under Ohio laws a forfeit of franchise does not exist merely by virtue of revoking a grant, but must be fixed judicially.

Syracuse Grant Fails

Council Rejects Service-at-Cost Plan After Months of Delay—Ten-Cent Fare Possible

By a vote of twelve to six the Common Council of the city of Syracuse, N. Y., on Nov. 30 rejected the service-at-cost plan in that city. The New York State Railways, which operates the railway lines in Syracuse, Rochester, Utica and Rome, had placed a proposition in the hands of the Council that the city administration direct service, assuring only that the company might realize a yearly revenue of 6 per cent on the sum of $12,000,000, a valuation placed on the property by Ford, Bacon & Davis, who made an appraisal for the city.

SETTLEMENT PENDING NINE MONTHS

Nine months ago the proposition was first advanced, and a representative commission was appointed to look into the matter. The New York experts were engaged and made a valuation. The finding of the engineers was considerably lower than the value set by the company on its property. The new figures were accepted by the company, but they did not meet with the approval of the Aldermen, as the many months of constant political wrangling testified.

In consequence of the action just taken by the Council the settlement of the railway question in the city of Syracuse appears to be just as far from a solution now as it was nine months ago. Following the action of the Common Council, B. E. Tilton, vice-president of the railway, gave out a statement to the effect that the company would probably apply at once to the Public Service Commission for a 10-cent fare to make up for the deficit suffered during the many months that earnings have been insufficient to meet operating expenses.

In discussing the action of the Common Council Mr. Tilton stated that the valuation found by Ford, Bacon & Davis was most reasonable, but notwithstanding that the Aldermen still seemed to believe that the 7½-cent fare asked was exorbitant. Mr. Tilton immediately ordered a drastic cut in the service on all lines and eliminated all but a few "owl" cars. This was done in the interest of economy.

MAYOR RESENTS COMPANY'S ACTION

Mayor Harry Farmer was incensed over this action. He stated that a complaint would probably be filed with the Public Service Commission to require the company to give the service deemed necessary to the convenience of the people of the city.

In the city of Utica the New York

State Railways also faces a complex situation. There the company is awaiting the action of the Common Council on an application for an 8-cent fare. The Council has on several occasions ignored the petition, while the Mayor has openly opposed the increase. A number of railway employees in Utica are out of work at the present time, the service is curtailed, and it is intimated that if the city continues to ignore the company's application the service would have to be curtailed still further.

Mayor Urges Railway Settlement

Louisville's Chief Executive Now Convinced That City Must Grant Fare Relief or Submit to Curtailed Service

Plans are being revised for a settlement of the railway problem at Louisville, Ky. In consequence the whole matter will probably be thrown open again soon for public discussion. Foremost in the present movement is Mayor Smith. He appears at last to have been convinced that the city will suffer materially if some forward step is not taken. In a message to the Council he has urged that the matter be considered promptly and disposed of.

THE appeal of the company for relief was made in March, 1919. Several conferences were held. In May the Mayor announced that he would oppose any increase in fares. Subsequently changes were made in the personnel of the company and an executive committee was created to administer the affairs of the railway. This committee consisted of W. S. Speed, John W. Barr, Jr., and William H. Kaye. After considerable study on their part of the affairs of the company and the problems before it they submitted to the Mayor last July an exhaustive report in which the committee asked for an increase in fare from 5 cents to 7 cents and suggested a service-at-cost franchise. In the meantime, however, trial operation at a 5-cent fare for three months under the direction of the committee was carried out in the hope of proving the case of the company to the city. The matter was allowed to drag by the city. It has now been revived by the Mayor on his own initiative.

In a message to the Council on Nov. 24 the Mayor said:

> During the fall of 1918 the Louisville Railway requested the city of Louisville, through me, to grant the company increased carfare. After carefully considering the situation at that time, in April, 1919, I published a statement containing facts and reasons why the company was not then entitled to relief. The company made no effort to deny or refute these facts or reasons. Indeed, subsequent events proved them to be true.
>
> Early in the year 1920 the request for increased fare was renewed. At that time I informed the directors of the Louisville Railway that no request would be considered until the company had reorganized under new executives and with certain new directors. I said at that time that if the company did reorganize as outlined and after a test was able to show that it was still unable to operate without serious loss I would recommend some form of relief. The company was reorganized, new directors were selected and a new president elected.
>
> On July 1, 1920, the company made direct application to the Board of Councilmen to grant relief on the basis of what is known as the service-at-cost plan. That body promptly and properly rejected this ordinance. Since then, I am informed, no new ordinance has been offered by the company.
>
> From figures submitted to me at the present time and carefully analyzed I find the company now is operating at a loss and will continue to do so unless assisted financially. Only two courses are open to the company; the one is to obtain increased revenue from higher fares, the other to reduce its operating costs. To reduce operating costs materially it will be necessary to reduce the service. It is our duty to decide which course must be pursued.
>
> You have so uniformly rendered such splendid service, and you have been so unflinchingly loyal to your duty, I should not have communicated with you at this time except I am convinced the subject is of such importance that I should urge you to take it up promptly and dispose of it.
>
> I ask you, therefore, to consider this problem in the light of public duty and public benefit, and to provide some measure of relief for the Louisville Railway.

J. E. Isgrigg, chairman of the committee of the Council to which the matter has been referred, is of the opinion that any ordinance looking toward relief for the company should originate with the Mayor or in the office of the city attorney. It is expected that he will call a meeting of the committee soon to consider the matter. The next general meeting of the Council will be held on Dec. 7.

Now that the time has arrived when to delay action further can only reflect greatly to the discredit of the city and to the embarassment of the general public, the Louisville papers are inclined to be severe with the Mayor in their editorial comment on his handling of the situation. The *Times* said that the Mayor's word to the Council is a mere alarm clock, buzzing:

> Gentlemen, it is high noon. You were supposed to be at work at 8. It is high noon. Get up or stay abed, but do something.

That paper said further:

> If the proper committees do not originate a program and initiate action, let one or all of the leading members of both bodies resolve themselves into a general committee and do it themselves. They have the ability; they do not take their political profession so seriously as to fear the "organization," and as responsible members of the community they know the perils of having an insolvent street car company in Louisville.
>
> If they or any of them will walk up to the street car question, take it firmly by the hand and lead it to settlement, they will find the community behind them. A few moves by patriotic members of the Council are in order if the duly authorized committees do not do their duty and promptly.

The *Courier-Journal* said:

> The Mayor's message to the General Council on the carfare question at least has the virtue of disclosing, after long delay, some form of action by the chief magistrate of the city. It breaks a silence and officially brings a grave problem before the two legislative boards. Aside from this the message is definite only in its indefiniteness. For the present the issue, involving most complex and profound principles of economics, is left with the individual and aggregated wisdom of twenty-four members of the Lower Board and twelve members of the Upper Board. And the public will now have another opportunity to behold how our city government operates.

City and Railway Discuss Compromise

Prospects Appear Bright for an Agreement Being Arrived at in Detroit Which Will Stop Litigation

Negotiations between the Detroit United Railway and officials of the City of Detroit, Mich., were renewed on Nov. 26 when Elliot G. Stevenson, counsel for the Detroit United Railway; the Mayor, Corporation Counsel Wilcox, Joseph S. Goodwin, general manager of the new municipal lines, and the Street Railway Commission met in the Mayor's office. No statement as to the proposals considered was given out except that the meeting was the first step toward establishing a working agreement between the city and the Detroit United Railway.

IN a statement made by Mayor Couzens, acting as spokesman for all parties concerned in the proposal, it was related that at a meeting attended by Mr. Stevenson and E. J. Burdick of the Detroit United Railway and the Street Railway Commission and the Mayor some months ago a suggestion was made that it was not outside the bounds of possibility that an arrangement might be made whereby the public would be benefited if there were less litigation. With that end in view the meeting on Nov. 26 was arranged. It was suggested that as the directors of the Detroit United Railway were to meet soon a plan for future action might be discussed that probably would meet with the views of the city administration and the directors. Mr. Stevenson left the meeting on Nov. 26 with the understanding that he would confer with the board of directors and meet with the city administration again on Dec. 6.

It is reported that city officials were planning to start action to take over certain non-franchise lines and lines operated on the day-to-day agreements as soon as cars were ready to be operated on the municipal lines that are now nearing completion. In order that the public might not be inconvenienced it is desired that these lines be acquired without long-drawn-out litigation. The company now operates certain lines in the city under day-to-day agreements, the franchises on which the city can terminate at will.

According to a ruling by Federal Judge Arthur J. Tuttle the city cannot acquire these lines with any part of the $15,000,000 bond issue voted last April, but can only cancel the franchises, leaving the company the choice of selling or tearing up its tracks. Resort to the latter course on the part of the city is unbelievable on account of the great inconvenience to which residents of certain sections of the city would be put. The opinion prevail that any proposition leading to the sal of these lines at a reasonable figure would be accepted and presented to the voters for approval.

It is believed that the Detroit United Railway would look with favor upon an agreement whereby the repairing of the day-to-day agreement lines could be avoided. The company is now in a position of having to spend thousands of dollars in repairing lines on streets from which it may be ousted at any time. It is believed that the sale of these lines to the city and an agreement under which the Detroit United Railway could operate over them until the city was in position to connect with them would be considered favorably by the company.

No attempt has yet been made by the municipal railway to cross existing lines of the Detroit United Railway and fear was expressed that another lawsuit would be started by the Detroit United Railway when the attempt to cross the company's lines was made. It is understood that the Detroit United Railway would be willing to permit the municipal lines to cross its tracks provided the city grants certain concessions in return, and it is believed that it would be more satisfactory if an agreement can be reached without appealing to the courts or having the matter referred to the Utilities Commission.

Unless delayed by weather unfavorable to construction work or by the non-arrival of material it is expected to operate the first cars on the municipal lines Feb. 1, over the Charlevoix and St. Jean lines.

"Movies" Refute Injury Claim

A novel use of motion pictures was recently made by the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., in defending a personal-injury suit filed against it. The company sought to show through the medium of "movies" that the plaintiff in the case, a woman, was not seriously injured in the accident, on which her $10,000 suit was based. It was testified at the trial that the company employed a motion picture man to make a "fake" verbal contract with the woman, leading her to believe that she was to be a "movie" actress, and thus obtaining pictures which might be used at the trial. Scenes showing the woman alighting from an automobile were among those shown to the jury in the case during the trial. The presentation was made at one of the local theaters. After some deliberation the jury handed down a verdict in favor of the plaintiff of $550. It found her, however, guilty of contributory negligence.

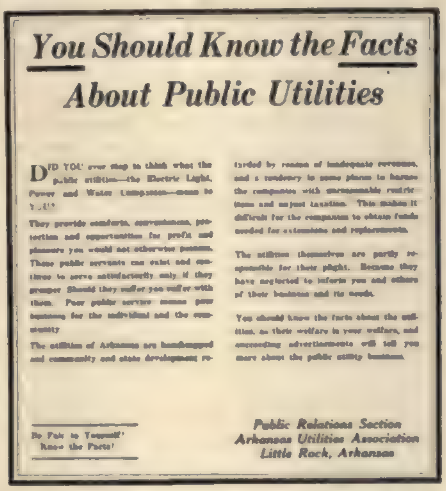
The plaintiff's attorney objected to the use of the film as evidence, claiming that it had been obtained through fraud and that motion picture films could be accelerated to make the plaintiff appear more active than she really was and that parts of the film could be cut out and other devices used. He is reported to have declared that the decision in the case will be appealed to the Wisconsin Supreme Court on the ground that the trial court erred in admitting a motion picture film as evidence.

Another State Bureau

Arkansas Follows Lead of Other States in Establishing Headquarters for Utility Information

Establishment of a public relations section to inform the public about the public utility business in Arkansas was decided upon at a meeting of the executive committee of the Arkansas Utilities Association held at Little Rock, Ark., on Nov. 10.

C. J. Griffith, president of the state association and manager of the Little Rock Railway & Electric Company, will be chairman. A. G. Whidden, until recently managing editor of the Pine Bluff *Daily Graphic*, was elected manager, with S. R. Brough, manager of the Arkansaw Water Company, Little Rock, treasurer. Other members of the committee are: Judge R. M. Foster, Helena; H. C. Couch, Pine Bluff; D. C. Green, Fort Smith; J. S. M. Wharton, Helena; A. S. Long, Little Rock; S. E. Dillon, Hot Springs; J. F. Christy, Jonesboro, and W. J. Thorpe, Little Rock.



You Should Know the Facts About Public Utilities

DID YOU ever stop to think what the public utilities—the Electric Light, Power and Water Companies—mean to you?

They provide comforts, conveniences, protection and opportunities for profit and pleasure you would not otherwise possess. These public servants can exist and continue to serve satisfactorily only if they prosper. Should they suffer you suffer with them. Poor public service means poor business for the individual and the community.

The utilities of Arkansas are handicapped and community and state development retarded by reason of inadequate revenues, and a tendency in some places to harass the companies with unreasonable restrictions and unjust taxation. This makes it difficult for the companies to obtain funds needed for extensions and replacements.

The utilities themselves are partly responsible for their plight. Because they have neglected to inform you and others of their business and its needs.

You should know the facts about the utilities, as their welfare is your welfare, and succeeding advertisements will tell you more about the public utility business.

Be Fair to Yourself!
Know the Facts!

Public Relations Section
Arkansas Utilities Association
Little Rock, Arkansas

ONE OF THE FIRST OF THE ARKANSAS ADS

Mr. Griffith issued a statement in which he said:

> It is our plan to publish information to show the people of Arkansas just what the utilities mean to them. The utilities provide not only comfort, convenience and protection, but contribute to the development of states and community resources and create new opportunities for operation of other profitable enterprises. Without electricity, telephone, gas and water services we would not have the industries, the cities, the opportunites for pleasure and profit we enjoy.
>
> The wonderful resources of Arkansas are not being developed as rapidly as they should be because of the impression in some quarters that there is a tendency to discriminate against investors in public service and other large enterprises. It is to show the detrimental effect of this tendency and to serve as a clearing house for information from other states relative to operating methods that this section of the association is established.
>
> The owners and operators of the utilities have come to realize that it is a mistake not to keep the public informed about the utility business. After all, it is the public that suffers or prospers as the utility suffers or prospers.

Open Shop in Shreveport

The citizens of Shreveport, La., have determined that the open-shop principle shall prevail in all local industry. Several months ago it appears that union labor had so completely tied up all lines of industry in the city that it became necessary for the public to declare for the open shop and to form an organization known as the Open Shop Association.

Although the Shreveport Railways, of which H. B. Hearn is president, has a contract with its employees which embodies the closed-shop feature common to most Amalgamated Association contracts, the company became a party to the efforts of the Open Shop Association, because it was convinced that this was a step in the right direction.

Subsequent to the formation of this association, practically all of the business interests of Shreveport, including the banks, agreed to start no new work of any kind except on the open-shop basis. All jobs under way at the time the organization was formed are to be continued to completion.

A climax to this situation in Shreveport came during the week of the recent Atlantic City convention of the American Electric Railway Association. It happened that an important piece of machinery in the plant of a local industrial concern broke down. It was impossible to get this repaired without great delay, except at the shops of the electric railway. The machine was accordingly taken to the railway shops and later the machinist declared they would walk out before they would do the repair work, because the machine came from a non-union shop.

Officers of the open-shop association thereupon wired Mr. Hearn about the situation, as the master mechanic did not feel that he had authority to make the decision. Mr. Hearn was caught on a train en route to the convention and upon being advised of the circumstances, he telegraphed back to have this work done in the railway shops "regardless of consequences." When the master mechanic received this telegram, its contents were disclosed to the shop men, who returned to their work and have had nothing more to say.

Service Resumed in Saginaw

Electric railway service was resumed in Saginaw on Thanksgiving morning on an agreement between the officials of the Saginaw-Bay City Railway and the city in which a new franchise is to be granted the company and the operation of the jitney bus curbed.

Pending the passage of a new franchise the company agrees to charge the old rate of fare; the employees who struck for higher wages will receive their demands, and in return the Council agrees to pass a regulatory jitney ordinance, which will forbid the operation of jitneys on streets where street cars run.

It is proposed to pass the new franchise on a cost plus basis. In return the company will agree to adequate extensions, and improvements to bring the service up to standard.

The Saginaw company, like all other traction companies in Michigan, has been trying to carry an added burden brought on by business depression. With many Saginaw factories closed, or working but part time, the revenue of the company has been considerably reduced.

The City Council has agreed to draft the franchise and have it ready for submission to the voters not later than May 1, 1921.

New Franchise Presented in Richmond

The Virginia Railway & Power Company, Richmond, Va., has submitted to the street committee of the Council of that city a tentative blanket franchise providing for an extension of the present grant of the company for a period of thirty years, at the end of which time the city is to have the right to purchase the property. The provision regarding fares prescribes an initial rate of 6 cents, with school tickets at 2½ cents sold in books of twenty each. A passenger will be permitted to carry free one child under five years of age, but two children under five years of age will be charged at the rate of fare then prevailing. Two cents will be charged for each transfer.

Under the proposed grant the right is reserved to the city to vary the fare from time to time so as to make possible the payment of a return of not less than 8 per cent upon the capital invested by the company. All questions in dispute will be settled by a board of arbitration, composed of a representative of the company, a representative of the city and a third representative chosen by these two. A local public utilities commission of six members will be appointed to adjust complaints about service, schedules and routes. Appeal may be made from the decisions of this commission to the State Corporation Commission. The proposed franchise has been referred to a committee of five, composed of Councilmen Puller, Gunst, Moore, Sullivan and English.

Commissioners Fight Ousting

Action has been begun before the New Jersey Supreme Court to determine the legal status of the members of the old Board of Public Utility Commissioners recently ousted by Governor Edwards on charges of inefficiency in office. The ousted commissioners recently appeared in court in answer to a summons secured by Attorney General McCran. They have been ordered to answer the charge that they are not legally entitled to remain in office and to draw their salaries and will be called upon to make a reply.

The Attorney General, acting in the name of the state, will then reply to the answer of the former board members, and the court will determine where and before whom the case shall be finally settled. The ousted commissioners are represented by Judge William L. Lewis, Josiah Stryker, B. Claude Palmer and L. Edward Hermann. The State Senate has so far refused to ratify the nominations for new members of the board recently made by Governor Edwards.

Toledo Measure Certified

Expected New Service-at-Cost Arrangement There Will Go Into Effect Next February

Arrangements are being made for a meeting during the week commencing Dec. 6 of the board of control under the service-at-cost arrangement approved recently by the people of Toledo, Ohio, at the polls.

MANY MENTIONED FOR COMMISSIONER

Dec. 5 has been set as the limit for the receipt of applications for the position of transportation commissioner. The board will receive written applications from anyone up to this time. Between that date and the time for naming a commissioner the board members will proceed to investigate personally the merits of several of the most acceptable applicants.

Among the men who have been mentioned for the position are Harry McClure, formerly city engineer; George L. McKesson, member of the service-at-cost commission, and identified with the Haughton Elevator Company; Cecil Rood, county surveyor; Arthur Wickenden, engineer with the Defiance Electric Light & Power Company; and John F. Collins, formerly assistant general manager of the railways at Toledo and now with the Michigan United Railways.

W. W. Knight, a member of the board of control, is in California. The first meeting will be held upon his return.

Officials of the Toledo Railways & Light Company, who conferred with Henry L. Doherty and his attorneys relative to the legal separation of the properties, upon which the ordinance is awaiting before it can be put into effect, stated upon their return to Toledo that the full ninety days allowed by the franchise plan would be needed to get ready.

The measure was certified by the city clerk as passed on Nov. 15. This would bring the measure into operation not later than Feb. 15.

COMPANY GOING AHEAD WITH REPAIRS

Attorney Morton Seeley at Toledo and Dewey C. Bailey at New York are making the legal separation and preparing for the operation of the Community Traction Company as created by the ordinance. Meanwhile Attorney Seeley is investigating all the liens against the present properties and adjusting them so that a clear title may be given to the new company when it takes over the lines.

Since the service-at-cost ordinance was ratified by the people of Toledo the company has gone ahead with needed repairs. On Tuesday Federal Judge Killits granted an order in court to spend $28,668 from the Craig fund mostly for repairs made to thirty-six cars. More than $80,000 has been spent out of the fund for the installation of fare boxes.

The Craig fund was set up by the federal court several years ago when a raise in fare was granted to the company. It makes it mandatory for the company to set aside 6 per cent of its revenue each week for betterments to service.

Labor Agreement Reached in Richmond

After a conference extending over four days with a committee of employees representing the locals throughout the system of the Virginia Railway & Power Company, Richmond, Va., an agreement was arrived at which was practically the same as that prevailing last year. The few changes made related to operating details, such as "runs," meal periods, seniority, etc. No change was made in the wage scale nor in the company's "open-shop" policy. Nor was the arbitration clause changed under which all matters may be arbitrated excepting those pertaining to wages or matters affecting operating costs.

The committee, however, was only authorized to negotiate. It took the new agreement back to the locals, and after an interval of about ten days the committee returned stating that it desired some further changes in some of the operating details discussed at the previous meeting. These were readily arranged in a one-day conference. It is understood that the revisions have since been accepted by the Richmond and other locals.

Strike in Clinton

Following the refusal of the City Council of Clinton, Iowa, on Nov. 16 to grant an increase in fare from 5 cents to 6 cents to the Clinton Street Railway employees of the company struck at 1 o'clock on Nov. 17. The company had made an increase in wages contingent upon the granting of an increase in fare. The employees have been working under a contract calling for the payment of 50 to 55 cents an hour, awarded them when the strike a year ago was arbitrated. They recently asked an increase to 70 and 75 cents an hour. The contract expired on Oct. 30, but the men continued at work with the understanding that if the company was granted the increased fare the company in turn would advance wages.

The strike is now reported to have been settled on the basis of a wage of 60 and 65 cents for the men, the company to charge a 6-cent fare, with nine tickets for 50 cents. Pending a permanent agreement as to the rate of fare refund coupons good for 1 cent will be issued for each fare paid.

News Notes

Electrification Rumor Denied.—Rumors that the Chicago, Milwaukee & St. Paul Railway would electrify the Des Moines-Boone and the Madric-Marion branch lines have been denied by Harry Warren, general passenger agent of the company.

Toronto May Run Buses.—The Board of Control of Toronto, Ont., will be asked by the Council to submit a bylaw to the voters on Jan. 1 calling for an appropriation of $1,000,000 for the purchase of motor buses by the city for use in passenger service. If the measure is successful at the polls bids for the vehicles will probably be asked early in 1921.

Spokane Men Want More.—Conductors and motormen of the Washington Water Power Company, Spokane, Wash., have petitioned their employers for an eight-hour day and further ask an increase in wages of 14½ cents an hour. W. E. Coman, general manager of the company, declares that "under the present earnings of the railway the expenses cannot be increased."

Request for Eight-Hour Day Denied.—F. E. Connors, vice-president and general manager of the Spokane (Wash.) Traction Company, has notified the employees that the company cannot at this time meet the request of the men for an eight-hour day. It is not expected that the matter will come up again until the expiration of the present working agreement between the company and the men in the spring.

Wage Advance in Muskogee.—Employees of the Muskogee (Okla.) Electric Traction Company will receive a wage increase of 5 cents an hour. The men had been receiving from 25 to 29 cents an hour. Under the new award the scale will run from 38 to 45 cents an hour. Funds for this wage award will come from the higher fare which went into effect in September of this year. Under an agreement with the city half of the increased revenue will be spent on improvements.

Wage Raise for Interurban Employees.—Employees of the Boston & Worcester Street Railway, Boston, Mass., have received a wage increase of 8 cents an hour. The men have been working for 52 cents an hour since July, 1919. In September of this year they demanded 95 cents an hour and a working day of eight hours in ten, instead of nine hours in eleven. The dispute was left to a board of arbitrators, Guy W. Cox, Boston, representing the company and James H. Vahey, Boston, representing the men. The wage increase will probably be retroactive to last September.

Suburban Men on Strike.—Trainmen of the South New Orleans Light & Traction Company operating between Algiers and Marrero, La., are firm in the statement that they will remain on strike unless their demands are met. On Nov. 1, when the men went on strike, it was believed that an amicable solution would be reached in the hope of the commission's passing favorably upon the company's application for increased rates. The men want retroactive pay due for forty days during a former controversy and retroactive pay since Nov. 1. At a recent meeting the men decided to return on the condition that President Burgis would pay the retroactive award pending the granting of 8-cent fares. This he is not willing to do.

Trackless Trolley in Prospect in Richmond.—There are prospects of putting the trackless trolley into service in outlying sections of Richmond when the Common Council takes action on the request of the Virginia Railway & Power Company for a new franchise. This statement is made in *Public Service News*, issued by the company. In this bulletin the company says: "Richmond has for a long time been in need of more transportation service. The company, as well as citizens of the community, has realized this, but the circumstances, financial and otherwise, have made extensions impracticable. When the new franchise is worked out we hope the company may be in a position to try out the trackless trolley, with a view of providing a flexible and dependable service for our residential sections."

Strikers Sentenced for Manslaughter.—Justice James C. Cropsey in the Criminal Branch of the Supreme Court in Brooklyn, on Nov. 29, sentenced to terms of from eight to twenty years in Sing Sing five men who had pleaded guilty to manslaughter in connection with the killing of Ferdinand Friedman during the strike of the employees of the Brooklyn Rapid Transit Company last summer. Edward J. Reilly and Louis Fridiger, who represented the accused men, made a plea for clemency, maintaining that the men were young and that they had served in the war. Justice Cropsey disagreed with the attorneys that the men had meant to injure no one. He said: "You were all guilty of murder. I think every consideration has been shown you when the District Attorney accepted your plea of manslaughter. You had the right to strike, but you did not have the right to interfere with any one who wanted to work."

Temporary Injunction Vacated.—The temporary injunction granted the Detroit (Mich.) United Railway restraining the city from expending tax money in the construction of its street railways has been dismissed by Circuit Judge Harry A. Mandell in one of the two formal decisions made by him recently. This injunction was sought by the Detroit United Railway immediately after the first contract had been awarded for work on the municipal railway on Charlevoix Avenue between Connors Avenue and Alter Road. In the other ruling the judge handed down the decision concurred in by Judges Webster and Dingeman, issuing a mandamus compelling Corporation Counsel Clarence E. Wilcox to approve the form of the ordinance offered by the Detroit United Railway last March in opposition to the ordinance containing the city's plan, which carried on April 5. It is the intention of the Corporation Counsel to appeal the mandamus suit to the Supreme Court. The injunction case is now before the Supreme Court on appeal.

Doherty Men Get Together.—"I can't see anything to disturb us seriously. I think the strength of our organization is due to its ability always to meet situations with courage and confidence." Such was the gist of a talk by Henry L. Doherty before 400 members of his organization who came many miles to attend the annual conference held at the Waldorf-Astoria, New York City, Nov. 22, 23 and 24. There were two sessions daily at which many subjects were discussed. Included in the list were "Employees' Representation Plan," "Publicity," "The Bond Department's Problems and Its Future" and "How We Can Sell More Doherty Securities in Our Towns." There were also sectional meetings of the public utilities, of the oil department and the bond department. These reflected the motto of the organization, which is "We don't always agree, but we do not undertake anything unless we do all agree." This meeting was in line with the practice of the Cities Service Company to call its managers together every year for a general conference. At this time particular stress was put upon questions of public policy and the necessity of rate adjustments to meet present operating costs. A general plan of operations was outlined for the coming year.

Program of Meeting

Equipment Men to Meet

The master mechanics of the electric railways of Ohio, Pennsylvania and West Virginia, who have been organized for the last three years as the Association of Electric Railway Men, will meet in Mansfield, Ohio, at 9 a.m., on Dec. 7, for a round-table discussion of numerous maintenance problems. The meetings of these men have been sponsored by the Westinghouse Electric & Manufacturing Company. They have proved of great value through the interchange of information about common problems. The meeting this year will be held in the offices of the Richland Public Service Company. Railway motor maintenance and electric arc welding will be discussed by J. S. Dean and A. M. Candy of the Westinghouse Company. A general discussion by the members will follow. A list of seventeen questions bearing on equipment maintenance problems has also been prepared as a guide to the discussion.

Financial and Corporate

Discontinuance Considered

Receiver of Buffalo-Depew Line May Abandon Property Unless $80,000 Is Raised

Unless $80,000 is subscribed for the rehabilitation of the Buffalo & Depew Railway Company, Buffalo, N. Y., application will be made by the receiver for permission to discontinue service between Buffalo, Depew and Lancaster and junk the property. A plan of rehabilitation and reorganization has been prepared by C. P. Franchot, attorney for William B. Cutter, receiver for the property.

DEFICIT FOR TWO YEARS

For almost two years the line has been operated by the receiver at a big deficit. The United States government holds receiver's certificates for $45,000 and banks hold receiver's certificates for $13,000. In addition there are several thousand dollars of receiver's notes outstanding in the hands of the public. The government financed the construction of a double-track addition to the company's property between Depew and Lancaster during the war to facilitate the transportation of war workers. The government was paid in receiver's certificates.

The plan of reorganization and rehabilitation outlined by Mr. Franchot calls for the holders of the company's first mortgage bonds to turn in their securities. These would be resold for approximately $80,000. Purchasers would in addition receive a bonus of common stock.

Under this plan there would be sufficient money raised to pay off or compromise all outstanding indebtedness and allow a reserve fund in the treasury for improvements. The new owners would then reorganize the company and the receivership would be terminated.

SEEK HELP FOR INTERNATIONAL

If this plan fails the company plans to carry on negotiations with the International Railway, Buffalo, with the view of having the International acquire the property, which is a 7-mile double-track line between the Buffalo city line and Lancaster.

Municipalization Planned

Plans for the operation of the Guelph (Ont.) Street Railway by the Ontario Hydro Radial Commission are being considered by the municipal authorities. Several conferences have been held between representatives of the city and Sir Adam Beck, representing the commission, and Premier Drury. The commission has promised to take over the management of the property as soon as the municipality desires.

The Guelph Street Railway matter is in the same position as it was before the agreement was signed between the commission and the city for the acquisition of the traction lines by the Hydro, the ratification of which was blocked by Premier Drury. It is proposed to submit a by-law to the ratepayers at the next municipal election to secure authority to raise a sum sufficient to rehabilitate the property and place it in better physical condition.

Premier Drury has advised the city to proceed with the work of improving the line and suggested that a charge be made by the Guelph lines for the privilege of interurban companies operating cars through the city. In this way, Premier Drury says, a substantial revenue could be obtained. It would be necessary, however, to lay heavier rails and improve the overhead system for heavy interurban cars.

Remarkable Progress at Montreal

Operating Deficit for Year Ended June 30 Reduced to $364,700, a Gain of $712,659 Over 1919—Total Deficit Now $1,728,812

The deficit of the Montreal (Que.) Tramways for the twelve months ending June 30, 1920, was $712,659 less than that for the previous year, according to the second annual report of the Montreal Tramways Commission. In its report the commission gives in detail the operations of the system. The deficit of the company was increased during the last year by $364,700. This sum, plus the deficit of $1,364,111 carried over from the previous year, makes a total deficit to date of $1,728,812. The receipts from passengers amounted to $10,578,890. From other items, such as freight, advertising, mail, etc., a sum of $203,580 was realized, making the total railway operating revenue $10,782,470 as compared with $8,645,548 in 1919. This was an increase of $2,136,922, or 24.7 per cent. The total operating expenses increased more than $1,000,000, or 20.5 per cent, over 1919, making a total of $7,840,359. The company was again unable to meet the annual payment of $500,000 to the city for the use of the streets, as provided in its contract with the city.

ACCORDING to the advance estimates by the commission the company was entitled to expend 24.7 cents a car mile for motor cars and 17.4 cents for trailers at a traffic density not exceeding 8.4. The actual density for the year was 8.386. Therefore the commission decided that the company, having complied with the conditions laid down in regard to mileage and density, was entitled to receive the allowance as granted. This allowance amounted to $5,749,116. If the company had not expended more than this amount it had the right to claim its operating profit, which is ⅛ of 1 per cent of the average total of the capital value during the year. For 1920 the latter sum was fixed at $37,285,347.

Excess of expenses over credits must be taken from the gross receipts to the point where they equal the operating profit. Where the excess is greater than the operating profit, as was the case in 1920, the company must submit a detailed statement in justification of the excess. Failure to justify the excess of expenses over credits results in the company itself having to pay the difference, but if the commission finds the justification sufficient it may authorize the company to take from the gross receipts the sums necessary to liquidate every approved item making up the excess, allowing the company its operating profit, less any part of the excess not deemed to be necessary.

For 1920 the excess of expenditure

INCOME STATEMENT — MONTREAL TRAMWAYS COMPANY

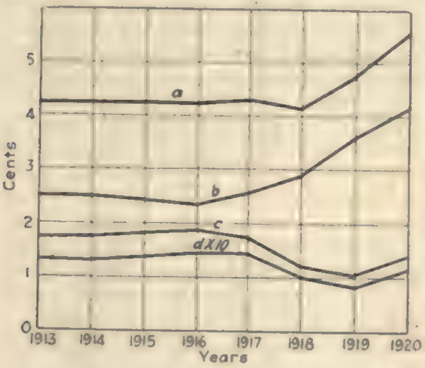
Year ended June 30	1920	1919	Percentage Change
Revenue from transportation	$10,578,890	$8,483,137	+24.7
Revenue from other railway operations	203,580	162,411	+25.3
Total railway operating revenue	$10,782,470	$8,645,548	+24.7
Maintenance of way and structures	609,766	516,160	+18.1
Maintenance of equipment	982,261	802,458	+22.4
Miscellaneous renewals	598,530	362,856	+65.0
Power	1,208,206	1,172,376	+ 3.1
Conducting transportation	3,056,348	2,423,936	+26.1
General miscellaneous	1,338,641	1,182,874	+13.2
Operating profit	46,607	45,928	+ 1.5
Total railway operating expense	$7,840,359	$6,506,588	+20.5
Net operating revenue	$2,942,111	$2,138,960	+37.6
Taxes assignable to railway operations	246,717	208,680	+18.2
Gross income	$2,695,394	$1,930,280	+39.6
Deductions from gross income:			
Interest 6% on capital value	2,177,178	2,189,200	— 0.6
Interest 7% on additions	69,827	16,205	+331.0
Interest 6% on working capital	23,833	34,347	—30.6
Financing expense	181,431	181,431	......
City of Montreal rental	500,000	500,000	......
Contingent reserve fund	107,825	86,456	+24.7
Total deductions from gross income	$3,060,094	$3,007,639	+ 1.7
Net income	*$364,700	*$1,077,359	+66.2

* Deficit.

STATISTICAL INFORMATION—MONTREAL TRAMWAYS COMPANY

Year ended June 30	1920	1919	Percentage Change
Total length of track	264.60	262.25	+ 0.9
Length of track in operation	246.03	243.68	+ 1.0
Car-miles	22,888,670	23,155,516	— 1.2
Revenue passengers	191,941,835	183,350,923	+ 4.7
Transfer passengers	63,744,151	65,711,288	— 3.0
Total number of passengers	255,685,986	249,062,211	+ 2.7
Gross receipts per mile of track inspection	$43,826	$35,478	+23.5
Gross receipts per revenue passenger (cents)	5.62	4.72	+19.1
Operating expenses and taxes per revenue passenger (cents)	4.21	3.64	+15.7
Percentage — operating cost and taxes to gross receipts	54.68	57.72	— 3.04
Percentage — maintenance and renewals to gross receipts	20.32	19.44	+ 0.88
Percentage — total operating cost to gross receipts	75.00	77.16	— 2.16
Statistics per car-mile:			
Operating revenue (cents)	47.11	37.40	+26.0
Operating expenses (cents)	34.20	28.10	+21.7
Number of revenue passengers	8.38	7.92	5.8
Car-miles per revenue passenger	0.119	0.126	— 5.6

for motive power was $122,712. The commission's estimate for this item was $1,085,494, based upon a probable saving due to the installation of a new substation which would permit the substitution of hydro-electric power for steam-generated power. This substation was not completed during the year and consequently the cause of the excess was apparent. The company also paid over and above allowances, $38,430 for taxes, $16,593 for snow removals, and $22,517 for insurance, all of which were unavoidable. The total excesses, amounting to $100,796, were therefore approved, and the company was entitled to its operating profit of $46,607.



a—Gross receipts per revenue passenger.
b—Operating expenses and maintenance per revenue passenger.
Net receipts for payment of fixed charges and dividends:
c—Per revenue passenger.
d—Per car-mile (scale 10:1).

At the end of the first year's operation under the present contract the gross receipts were sufficient only for the operating expenses and taxes, the cost of maintenance and renewals and a part of the interest on the capital invested. For the second year, ended June 30, 1920, the results were better, and there was sufficient to pay operating expenses and taxes, maintenance and renewals, all the interest on capital invested, original and additional, and also $120,212 for financing expenses out of $432,784, which should be provided. Therefore the commission believes that next year the company will be able to commence to make payments to the city. The contract provides that the company pay $500,000 a year for the use of the streets. The total amount owing the city on this account is now $1,192,694.

The company has deposited $100,000 both years as required by the contract as a fund against which action could be taken for failure to carry out the provisions of the contract.

Receivership Suit Carried to U. S. Supreme Court

An appeal has been taken to the United States Supreme Court from the decision of the Federal Court of Appeals in St. Louis in the receivership suits against the United Railways, St. Louis, Mo. The original receivership suit was filed by John W. Seaman in the United States District Court. In addition to asking for a receiver for the company it sought to recover large sums from the directors. While this suit was pending a second receivership suit was filed by Samuel Adler. In the Adler suit the United Railways admitted its insolvency.

District Judge Dyer held that the Seaman suit should take precedence over the Adler suit. Mr. Adler appealed to the Circuit Court of Appeals. That body reversed Judge Dyer. It held that Mr. Adler was entitled to have a receiver appointed. Mr. Seaman has now taken an appeal from the decision of the Circuit Court of Appeals to the Supreme Court.

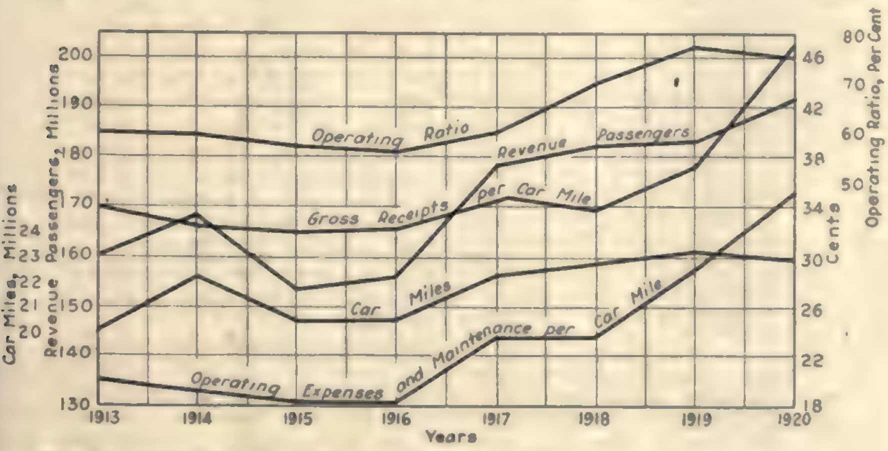


CHART SHOWING PROGRESS MADE BY MONTREAL TRAMWAYS FROM BEFORE WAR TO THE PRESENT

Duluth Earnings Shrink

Figures to show that the Duluth (Minn.) Street Railway has increased operating costs and a decreased income this year in comparison with 1917 were submitted to the City Council on Nov. 26 by Herbert Warren, vice-president and general manager of the company. Mr. Warren agreed to meet with the City Council and discuss the question of bettering the service. The table submitted by Mr. Warren follows:

October:	1920	1917
Gross revenue	$157,078	$140,986
Operating expenses	134,076	93,988
Net revenue	$23,001	$46,997
Interest, sinking fund, taxes	25,387	30,489
Net income	*$2,385	$16,508
Year to Date:	1920	1917
Gross revenue	$1,620,745	$1,338,087
Operating expenses	1,310,727	849,881
Net revenue	$310,018	$488,206
Interest, sinking fund, taxes	260,182	252,481
Net income	$49,835	$235,724

* Deficit.

Financial News Notes

Seeks to Sell Another Shore Line Section.—Robert W. Perkins, the receiver of the Shore Line Electric Railway, Norwich, Conn., has filed a petition in the Superior Court asking that he be allowed to sell that portion of the Shore Line lying in Westerly, extending from Pleasant Street to the Pawcatuck River at White Rock. This portion of the railway is said to be one of the few sections that has in the past been operated on a paying basis.

Receiver Asked for Barre Road.—The Westinghouse Electric & Manufacturing Company applied on Nov. 26 for the appointment of a receiver for the Barre & Montpelier Traction & Power Company, Barre, Vt. An injunction was also served to stop a sheriff's sale of railroad property to satisfy a judgment of $5,500 secured against the road by Robert Stewart. The action was declared to be designed to prevent the depletion of the assets of the railway.

Manchester Company to Offer Stock.—The stockholders of the Manchester Traction, Light & Power Company, Manchester, N. H., have voted to increase the capital stock of the corporation from the present amount of $3,864,000 to $4,250,000. The new stock will be offered proportionately to the present stockholders at $100 per share.

Equipment Trust Plan Approved.—The Board of Public Utility Commissioners of New Jersey has approved an equipment trust agreement between the Public Service Railway, Newark, N. J., and the Philadelphia Trust Company, as trustee, and the Standard Steel Car Company. Under the agreement the Public Service Railway will issue $1,300,000 of equipment certificates at par. The certificates will bear interest at the rate of 8 per cent.

Rochester Valuation Under Way.—J. C. Brackenridge, representing the city, B. C. Campion, representing the railway, and E. G. Connette, neutral member, are busily engaged upon the task of appraising the Rochester lines of the New York State Railways. The field work is expected to require four or five weeks for its completion. Session of the full board will then be held to fix the final determination. The appraisal will probably not be ready to be made public until early in 1921.

Fort Wayne Traffic Increasing.—Pressure of traffic in Fort Wayne, Ind., has resulted in the re-establishment of the old belt line service in that city which was discontinued in 1914. The old tracks, which had been disused for so many years, have been replaced by new tracks and a four-minute schedule will be in force over the line during the rush hours. Traffic in Fort Wayne has been increasing rapidly during the past few weeks with the advent of cold and disagreeable weather.

Bus to Replace Railway.—The City of Greenville, Tex., has purchased the railway system of the Greenville Power & Traction Company, which has been in receivership. The road has not been in operation for some time. The city paid $15,000 for the property, which includes about 7 miles of single track, trolley wire, carhouse and other equipment with the exception of seven cars. The city will junk the line and sell it and with the proceeds will establish a municipally owned motor bus transportation system.

Agreement Appears Likely.—The postponement for a week of the appointed hearing in the proceedings for the confirmation of sale of stock of the American Railways, Philadelphia, Pa., held as collateral by the National Properties Company, is taken to be an indication that the minority bondholders' committee and the majority bondholders' committee have come to an understanding which may result in the withdrawal of the petition in bankruptcy recently applied for, on the basis of the appointment of a receiver for this company.

Segregation Planned.—Plans for the segregation of the lines in the Ohio Electric Railway system have been announced by J. H. McClure, vice-president of the company. A meeting of the stockholders will be held at Philadelphia on Dec. 11, at which time the division of the present system into its two tributary lines—the Indiana, Columbus & Eastern and the Ohio Electric Company—will be passed upon. The former road operates between Lima, Dayton, Springfield, Columbus and Zanesville, while the latter operates from Lima northward into Toledo.

Upward Turn Seen in Utility Securities.—H. M. Byllesby, who recently returned to Chicago after a visit to the Southwest on the annual inspection train of the Texas Oil Company, says that the consensus of opinion on the part of the gentlemen on the special train, who represented, without exception, large financial interests and operations, was that the utility securities were due for a substantial rise; that they had weathered the recent storm as well as, if not better than, any other class of securities; that the situation was at present far better understood by the public and the law makers; and they all predicted a greatly improved and very satisfactory condition, now appearing in all utility investments.

Receiver Wells Reports for September.—The September report of Rolla Wells, receiver for the United Railways, St. Louis, Mo., filed in the United States District Court in St. Louis, shows that on Aug. 1 the cash on hand was $2,920,172 and that on Sept. 30 the cash on hand was $661,256. The difference in amounts was explained by the fact that in September the sum of $2,285,000 was used to redeem receiver's certificates which fell due on Sept. 2 and for which money had been set aside from the August receipts. The largest items in the receipts for September were $724,544 conductors' remittances and $968,817 from the sale of tokens. The redemption of receiver's certificates was the largest disbursement item. In September the company paid $29,420 in back wages and $829,993 accrued wages.

Outlook More Hopeful.—The protective committee representing the holders of $260,000 of 4½ per cent twenty-year bonds of the Brockton & Plymouth Street Railway, Brockton, Mass., due on Dec 1, 1920, announced recently that there was no way by which the bonds could be paid at maturity. The members did say, however, that from their constant study of the situation they believed that the outlook for a reasonable settlement in the near future was hopeful. The committee, believing that the interests of the bondholders would be best protected by continuing the receivership, has approved such continuation. Interest on the bonds has remained unpaid since Dec. 1, 1918. The protective committee consists of Francis E. Frothingham, Arthur Perry and Alfred A. Montgomery. The road has been operated since Dec. 9, 1919, by Hollis T. Gleason as receiver.

Stockholders Approve Abandonment.—The stockholders of the Providence & Danielson Railway, Providence, R.I., on Nov. 22 authorized the directors to dispose of the company's property. In short, the security holders confirmed the action of the directors and officers in discounting the operation of the road and approved the action of the latter authorizing the abandonment and sale of certain portions of the road.

Announcement was made on Nov. 27 by D. F. Sherman, president of the company, of the sale of the rails, poles and wires and all other equipment of the road, from North Scituate to East Killingly, Conn., some 20 miles of railway, to M. C. Fairchild & Company, Inc., New York, and Swift & McNutt, Boston, who will tear up the rails and junk the system. At the present time the road is not in operation, but the branch of the system from Providence to North Scituate has been reserved by the company with the hope that some arrangement may result from the negotiations now under way looking to the resumption of this line.

Sea View and Pier Roads to Be Sold.—The Sea View Railroad, Providence, R. I., will be sold for scrap. This decision was reached at a joint meeting held recently of the various committees appointed by the towns of South Kingstown, North Kingstown and Narragansett. Nathaniel T. Bacon, the present owner of the property, declared at the meeting that this was the only course open in view of the fact that the report made by the various committees showed the towns to be unwilling to bond themselves for the purpose of financing operation of the lines. Mr. Bacon stated he was willing to let the towns have the road at its scrap value, but that if it was the sentiment of the towns that it would be inadvisable to take the line over there was no further need for argument. He declared that the scrap value of the two roads, the Sea View and the Narragansett Pier Railroads, was $220,000. He added that this sum included the real estate owned by the company. According to Mr. Bacon, the road will be sold to M. C. Fairchild & Company, Inc., New York.

Protective Committee for Interurban Holders.—A protective committee has been formed to represent the holders of the first mortgage 5 per cent bonds of the Columbus, Newark & Zanesville Electric Railway, Springfield, Ohio, due 1924. Livingston E. Jones, president of the Saving Fund Society, Germantown, Pa., is chairman, and William A. Law, president of the First National Bank, Philadelphia, and A. A. Montgomery, treasurer of the Portland Savings Bank, are the other members of the committee. The circular of the committee states that "the interest due on Nov. 1 last on the Columbus, Buckeye Lake & Newark Traction Company first mortgage 5 per cent bonds of 1921 was not paid, and a protective committee has been formed in the interest of holders of that issue. This default makes it obligatory, in order better to safeguard their interests, that all owners of the Columbus, Newark & Zanesville Electric Railway first mortgage 5 per cent bonds, due 1924, unite and deposit their bonds with the Girard Trust Company, Philadelphia."

Traffic and Transportation

Traffic Changes Suggested

Expert Thinks Memphis Equipment Adequate, but Recommends Expenditure for New Construction

Ross W. Harris, Madison, Wis., consulting engineer, has submitted to the Railroad & Public Utilities Commission of Tennessee his report on the traffic survey of electric railway conditions in Memphis, Tenn. The survey was made under order of the State body by Mr. Harris himself for the joint account of the Memphis Street Railway and the city of Memphis. Six months was required to complete the job.

The state commission has since handed down an order approving the recommendations set out in the report and ordering the Memphis Street Railway to proceed to put the recommendations into effect. About $140,000 worth of property will be abandoned and approximately $75,000 of new construction will be required.

MR. HARRIS IN CHARGE

At the joint request of the city and the company the state commission has issued an order appointing Mr. Harris as its representative in Memphis to supervise the operations of the Memphis Street Railway. In this work it is expected Mr. Harris will put into effect the scheme of line standards used with good effect by him in other cities. This calls for following out a system of determining equitable daily line standards for each route in such manner as will connect operation equitably with the rate of fare, rate of cost of service, integrity of securities, volume of business, etc.

The full report is now being printed and bound for distribution. The principal recommendations contained in it, however, have been outlined by Mr. Harris for the benefit of the public.

If the recommendations made by Mr. Harris are followed, Main Street will be relieved of street railway congestion, with more cars on Third Street than are now on Main Street; with a greater transfer point at Third and Union, and with more cars passing every hour of the day than now pass Main Street and Madison Avenue.

According to the plan advocated by Mr. Harris, the principal railway loop will be Third Street to Jefferson Avenue to Main Street to Union Avenue. Front Street will be practically abandoned by the street cars. The congestion on Main Street will be relieved by having as much traffic on Third Street through Jefferson to Union.

In order to gain some idea of the situation, it is only necessary to state that cars are now operated on Main Street at the rate of 120 per hour, on one track in one direction, and occasionally the rate is as high as 152 an hour.

Mr. Harris believes that the Memphis Street Railway has a sufficient number of cars and that its equipment is adequate to take care of the traffic with the rerouting and distribution which he proposes. He says that the receivers have done remarkably well in maintaining the present standard of service under the system that is now in vogue.

Asks Ten Cents in Trenton

The Trenton & Mercer County Traction Corporation, Trenton, N. J., has filed a petition with the State Board of Public Utility Commissioners asking an increase of fares from 7 to 10 cents in Trenton and on all its suburban zones. The railway proposes to relinquish the 1-cent transfer charge. The petition will come before the board at a hearing on Dec. 15. The company has announced that unless relief is granted it will face insolvency. The New Jersey State League of Municipalities will be called upon by Mayor Donnelly of Trenton, who is chairman of the executive committee of the league, to oppose the fare increase.

Mayor Donnelly has announced that he will move for the inauguration of a motor bus service for Trenton and vicinity, paralleling the traction company's lines, to be operated under municipal franchises. The Mayor says that the proposed bus system would be different from the ordinary jitney service and that double-deck buses of large size would be placed in operation.

The Trenton & Mercer County Traction Corporation declares that 10-cent fares are absolutely necessary to maintain its property and its service at the present standard; that it has not paid any dividends whatever and no rentals in more than three years, and that the cost of operation has increased during the past year to such an extent that deficits have continued to grow. The company says that there is no possibility of a reduction of rates of wages at present paid motormen, conductors, operators, powerhouse employees and electrical workers, and that the cost of all materials has been advanced. The railway's petition says:

> We are not alone in this situation. It is nation-wide. Traction companies in forty-nine cities are charging a base rate of 10 cents, and many other applications for 10-cent fares are pending. No company can operate for less than cost.

The present 7-cent fare and 1-cent transfer rate was put into effect on Jan. 4 last. The revenue for the present year will amount to approximately $1,387,733. The total operating expenses and taxes for 1920 will amount to $1,239,987. The deficit for the year will be more than $440,262.

Cleveland Results Good

Early Returns Indicate Fare Increase and Industrial Depression Have Not Affected Company Adversely

Patrons of the Cleveland (Ohio) Railway on Nov. 14, began paying a 6-cent fare with 1 cent extra for a transfer. They met this increased rate as predicted in the ELECTRIC RAILWAY JOURNAL of Nov. 13, without a murmur.

While the new rate of fare makes Clevelanders for the first time in the city's history pay more than a nickel for a car ride, it has taken ten years for street car fare in Cleveland to double, as in November, 1910, the rate of fare was 3 cents cash with a 1-cent charge for transfer.

NO DECLINE IN TRAFFIC

No figures to indicate how the recent raise has affected the receipts of the company are as yet available, but at the offices of the Cleveland Railway it was said that there was a very marked increase in revenue and that no falling off in the number of riders had been noticed. In fact, Cleveland, unlike other large industrial cities, has so far been free from any reflection in its railway receipts from the recent industrial depression.

It is a curious fact that residents of two of Cleveland's populous suburbs, Lakewood and Cleveland Heights, can ride to and from their places of residence more cheaply than car-riders within the city limits proper. This is due to the fact that Lakewood and Cleveland Heights both have franchises that call for a straight 5-cent fare. This situation again demonstrates the unfairness of incorporating in a long term franchise a fixed maximum rate of fare.

SUBURBAN FARE UNCHANGED

The Cleveland City Administration, City Street Railway Commissioner Sanders and the newspapers are now engaged in a campaign urging Lakewood and Cleveland Heights car riders voluntarily to pay the increased rate demanded of the city riders. Some of the officials of the two suburbs have indicated their willingness to change the franchises so as to permit the increased rate for Lakewood and Cleveland Heights riders.

In this connection the Cleveland *Plain Dealer*, in commenting editorially on the recent report of the American Electric Railway Association showing the upward trend of electric railway rates, said:

> Its own report indicates an increasing tendency on the part of American cities to treat railway companies fairly while preserving the interest of the car rider. The course of fares in the future as in the past will be determined mainly by the cost of operation.

Since the agitation was started for an increase in fares in the suburbs, the Cleveland City Council has passed a resolution asking Lakewood and Cleveland Heights to raise their fare from 5 cents to 6 cents to conform with the new rates of fare in Cleveland.

Bus Issue Unsettled

The Connecticut Company Continues Operation in Waterbury Pending Action by Aldermen

The federal trustees of the Connecticut Company, New Haven, Conn., at their meeting in New Haven on Nov. 27 reported that the revenue of the company had increased materially since the 10-cent fare went into effect. The receipts were nearly sufficient to meet expenses, it was announced. The trustees, however, are not at all satisfied with the action of cities throughout the State with regard to jitney regulation.

The trustees are said to be dissatisfied with the situations in Waterbury and New Haven. It was believed by the trustees that the ordinances restricting jitneys in New Haven and Waterbury did not meet the requirements as laid down by the trustees for assurance of uninterrupted railway service.

Although the Board of Aldermen of Waterbury on Nov. 26 failed to pass an amendment to the jitney ordinance barring jitneys from Bank Street in that city, it was said that the trustees had not taken any definite action relative to that situation. The ten-day period agreed upon by the representatives of the company and the city of Waterbury at the hearing before the Public Utilities Commission in Hartford last week was to expire on Dec. 3. Chairman R. T. Higgins of the Public Utilities Commission recently stated that he hoped the results would warrant the continuance of railway service in Waterbury.

WATERBURY LINES LOSE

Lucius S. Storrs on Dec. 1 addressed a letter to Mayor W. S. Sandland of Waterbury, in which he said in part:

> For the period of seven days to and including Monday, Nov. 29, the average daily revenue on the Waterbury Division has been $4,347, which you will note is a marked falling off from the revenue of the first few days, which was $4,613 per day.
>
> This is accounted for by the decline in revenues upon these lines on which competitive jitney operation is possible under the recent ordinance, mainly East Main Street, the revenues on which average but $894 per day for the period, the average for the first four days having been $991. The number of jitney buses operating on that route have increased from one on Tuesday, the 23d, to eleven on Monday, the 29th.

R. B. Stoeckel, State Motor Vehicle Commissioner, in his biennial report issued Nov. 29 stated that legislation by the state rather than by municipal ordinances should be obtained to effect regulation of public jitney traffic throughout Connecticut. The report states that the number of public service motor vehicles registered by the department declined from 3,025 in 1919 to 628 in 1920. With regard to the regulation of public motor vehicle transportation in the state as affecting the trolleys, Commissioner Stoeckel says:

> The various emergencies created between competing transportation systems and more particuarly between the public service vehicles and the trolleys have created a situation which seems to call for additional State legislation. If it is proper that the public service motor vehicle be regulated beyond the point to which the regulation now extends, then that regulation should be made by state law rather than by city ordinance.
>
> That is, if the operation of the public service motor vehicle is to be determined as to routes, stopping places, continuous service and other like details, as is the case with other carriers of the public, then such legislation should be statewide.
>
> In making such legislation, if it is determined that such is necessary, great care must be taken that the functions of this department relating to the determination of the fitness of an operator and as to the safety appliances and general equipment of the vehicle be not interfered with in any way. This department has the necessary machinery to examine into qualifications of drivers and into safety appliances of vehicles.
>
> As regards the latter point, the department needs a law giving it discretion as to what it will pass as a safety factor in connection with the public service motor vehicle. There are, at the writing of this report, many public service motor vehicles on the highways which are topheavy because a light chassis has been loaded with too heavy a top. Whatever else is done in connection with the public service motor vehicles the functions of this department must include the ones referred to to safeguard the public, and the department must cause the necessary legislation to make them absolutely effective.

Plea for Special Rates for School Children

A campaign to have the Cleveland (Ohio) Railway establish a special fare for school children at 3 cents a ride or forty tickets for $1 is being waged by the Cleveland *Press*. As proposed, the plan would restrict the 3-cent or 40-ticket-for-a-dollar rate to the school children riding on school days between the hours of 7:15 a.m. and 4:30 p.m. The campaign was started immediately after the fare in Cleveland was boosted to 6 cents with a 1-cent charge for transfer.

John J. Stanley, president of the Cleveland Railway, has so far refused to give an opinion on the proposal, but City Street Railway Commissioner Sanders is objecting to it on the ground that it is directly contrary to the spirit of the Tayler service-at-cost franchise, which provides that all riders shall be treated equally in the matter of fare and none shall be discriminated against for any reason.

Mr. Stanley has, however, indicated that he is not inclined favorably toward the plan on the ground that if the general industrial depression should hit Cleveland, there is no certainty that a 6-cent fare will suffice to meet the cost of operation. Increased tax levies approved by the people at the election in November will boost the Cleveland Railway's taxes $150,000 a year, company officials say.

Public and parochial school officials, members of women's organizations, and some other civic bodies have approved the low fare for school children. The City Council is now considering the plan.

Fare Reduction Sought

The town of Winthrop, Mass., has petitioned the Massachusetts Department of Public Utilities asking for a reduction of fare on the narrow gage electric line of Boston, Revere Beach & Lynn Railroad. At present the fare is 10 cents. A similar petition for a reduction in fare has been presented by residents of Revere.

Cincinnati Fares Up

Ticket Rate Advances Half Cent—City Asks Injunction, Alleging Faulty Allocation in Certain Accounts

The Cincinnati (Ohio) Traction Company on Dec. 1 raised its cash fare from 8 cents to 9 cents. Two tickets are sold for 17 cents, or six for 51 cents, making the ticket rate 8½ cents.

If the contentions of the City of Cincinnati as set forth in a suit filed by Solicitor Saul Zielonka in Hamilton County Court of Common Pleas are sustained, the end of the increases in fare in Cincinnati is in sight and a downward revision of these fares will result. Acting under the instructions of the City Council with respect to a report made by Street Railway Director W. C. Culkins, that the Cincinnati Car Company and the Ohio Traction Company owe the Cincinnati Traction Company thousands of dollars for rent, light and electric power supplied, City Solicitor Zielonka filed the suit, which demands an accounting from the Ohio Traction Company for light and power provided and for rentals for buildings from Jan. 1, 1917.

In the petition the court is asked to determine the amount due to the Cincinnati Traction Company and to compel its payment, and, if the sum is sufficient to create a fund which meets the provisions of the new ordinance under which the traction company is operating, an injunction to prevent further increases of fares is demanded, as well as an order to decrease the rate of fare charged.

MR. SCHOEPF'S EXPLANATION

W. Kesley Schoepf, president of the railway, has replied to the charge made by Mr. Culkins. Mr. Schoepf contends that the total sum to be accounted for by his company is $20,000 instead of $350,000. Mr. Schoepf is in full accord with the views of the director that any agreement between the Cincinnati Traction Company and the Ohio Traction Company, or between it and the Cincinnati Car Company that would be inequitable to the Cincinnati Traction Company is contrary to the spirit of the revision franchise. He says that the $20,000 in question is the amount payable by the Cincinnati Car Company to the traction company for light, heat and power.

He also states that he believes that the maximum rate of fare will be reached on March 1, when a straight 9 cents may be necessary. He expressed the belief that if granted the full requirements for the budget of the year of 1921 the fare will not go above 9 cents, unless some extraordinary condition looms up. Mr. Schoepf also says that he does not believe that this maximum will continue for long.

In answering Mr. Culkins' charge that the Traction Building is lighted by power which belongs to the car riders, the company says that a full accounting for current used in the building since the operation under the service-at-cost franchise would be $800.

City Grants Relief

Eight-Cent Fare Allowed in Grand Rapids—Attempt to Force Referendum on Fares

An 8-cent cash fare with seven tickets for 50 cents will take effect in Grand Rapids, Mich., on Dec. 16. The new rates have been authorized by the City Commission to afford financial relief to the Grand Rapids Railway. The fare is now 7 cents.

The railway recently applied to the city authorities for a 10-cent fare. The commission, although admitting the justice of the railway's petition, refused to allow the 10-cent rate because of the stand taken by the Trades and Labor Council, the body representing the organized labor of the city. The council threatened to force a referendum on the fare increase unless the 10-cent fare were granted by the commission.

UNION ASKS REFERENDUM

Organized labor stood out for the higher fare to back up a demand of the railway's employees for an advance in wages. The carmen were promised a wage increase from 60 cents to 62 cents an hour, provided the fare was raised to 10 cents. Petitions for the proposed referendum have not yet been circulated. A small group of citizens has endeavored to stir up feeling against the rate increase by an "I walk—Do you?" campaign, but with little success.

In September the Grand Rapids Railway did the largest month's business in its history. Nevertheless, on a basis of a 7-cent cash fare, with sixteen tickets for $1, it lost about $1,500. This was the best financial showing made by the company in a year. In October the financial report of the company was the poorest in its history, showing an actual operating loss of $23,000, due to an increase in wages of from 52 to 60 cents an hour, and also to the dropping off in patronage resulting from the business depression which set in at Grand Rapids about Oct. 1. With winter coming on the company found itself facing a monthly loss of more than $25,000, and the commission was quick to respond to its request for aid.

ESTIMATED TICKET RATIO 60 PER CENT

Under the present rate of fare—7 cents cash and sixteen tickets for $1—statistics compiled by the company show that a little less than 40 per cent of the company's passengers use tickets. It is estimated that under the new fare 60 per cent of the car riders will use tickets and 40 per cent will pay the cash fare. Patronage based on the October business, at the increased rate, should net the company in the neighborhood of $25,000.

Financial statements for the first ten months of the present year indicate an actual loss for the company during 1920 of $150,000. The loss for the first ten months totals $125,000.

A wage agreement of the company with its men expired Sept. 1, and the company offered 60 cents an hour, as against a demand for 68 cents on the part of the men. The working contract provides for arbitration, but the company and its employees could not agree on the third arbitrator. With wages decreasing locally almost weekly the men signed an agreement on Nov. 1 for 60 cents an hour, effective until May 1, with the further understanding that they should receive 62 cents an hour in the event the City Commission at any time before May 1 granted a 10-cent fare.

SPEED WORK ON FRANCHISE

The present franchise of the Grand Rapids Railway will expire on April 4, 1921. The company will be forced to operate under a working agreement with the city from that time until the new franchise can be submitted to the voters, which cannot be before Aug. 1, and may not be before April, 1922.

Members of the special committee of the City Commission having in charge railway affairs last week blocked an attempt which was being made to make the franchise a political football, when they instructed the engineers at work making an appraisal of the company's property to complete their task at the earliest possible moment. Those in charge of drafting the new franchise were also instructed to complete their work at once. The appraisal is being made on the basis of three costs. The first is a historical cost, the second the value on the average price for the last five years and the third on present-day values. The inventory work is now completed, and the valuations should be in the hands of the company and the city about Feb. 1. Provisions for service-at-cost will be contained in the new franchise.

May Put Absolute Ban on Parking

The local-transportation committee of the City Council of Chicago, Ill., has unanimously recommended that all parking in the downtown business district of Chicago be prohibited between 7 a.m. and 6:30 p.m. The final decision in the matter rests with the Council, but Chairman Schwartz, who advocated the measure, believes that its adoption is assured.

Traffic experts told the committee that enforcement of the ordinance would save Chicagoans from $20,000,000 to $25,000,000 annually in time saved and accidents prevented. If the ordinance becomes law it will be the duty of the police to see that all vehicles, whether horse-drawn or automotive, stop only to load or unload passengers, baggage or merchandise in the no-parking area between the hours stated. The anti-parking district as defined by the proposed ordinance is bounded on the south by Harrison Street, on the north by Kinzie Street, on the east by Michigan Avenue, and on the west by Clinton Street. The measure was opposed before the committee only by the representatives of the local automobile clubs.

Another Increase Needed

Dallas Railway Unable to Earn Authorized Return Under Six-Cent Fare —Fewer Riders Carried

The Dallas (Texas) Railway has found that the 6-cent fare granted it last July is inadequate to enable the company to earn the authorized 7 per cent on the agreed valuation of its property under the terms of its franchise. Richard Meriwether, vice-president and general manager of the railway, recently pointed out the reasons why the 6-cent fare had proved insufficient. Mr. Meriwether expressed the belief that an 8-cent cash fare with two tickets for 15 cents would prove adequate and would enable the company to maintain service and at the same time to earn its authorized return.

The decreased revenue of the company under the 6-cent fare, according to Mr. Meriwether, is due to three factors:

1. Material reduction in the number of passengers carried, which decreased the gross earnings of the company.
2. The very material increase in the cost of power, due to the higher cost of fuel. Power costs for September were approximately 3½ cent per kw.-hr., as compared with 1.4 cents per kw.-hr., when the power company purchased oil at 90 cents a barrel. The company is now paying $3.50 a barrel for fuel oil.
3. Increased wages to car operators. An increase in pay was granted immediately before the 6-cent fare went into effect.

FARE SITUATION DISCUSSED

Mr. Meriwether goes into detail in explaining that money spent for extensions and improvements in the Dallas Railway's system does not come from the gross earnings of the company, but is obtained by the sale of securities, and in no way affects the earnings of the company, except that the added value of the property gives a larger amount on which to calculate the authorized return of 7 per cent.

Discussing the unprofitableness of the 6-cent fare and the reasons therefor Mr. Meriwether said:

> We could not foresee that passenger traffic would greatly fall off when we asked for the 6-cent fare, nor at that time could we have shown that a higher fare than 6 cents would be needed. In our application we called attention to the fact that traffic probably would decrease immediately following the increased fare, but we had every reason to believe that it would return to normal after the first month. It has failed to do so.
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> For the last three years the number of passengers has steadily increased, the monthly average carried in 1918 being 2,829,000, which increased to 3,927,247 in 1919, and to 4,523,050 for the first six months of 1920. Instead of continuing the steady increase as was anticipated the average number of passengers carried during July, August and September, the first three months of operation under the 6-cent fare, was but 4,275,602.
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> Taking the first six months of 1920 the number of passengers carried, month by month, was: January, 4,816,027; February, 4,088,823; March, 4,641,792; April, 4,604,369; May, 4,880,451; June, 4,606,839. Immediately following the 6-cent fare the traffic decreased to 4,287,275 in July, 4,277,702 in August, and 4,261,827 in September, showing a steady decrease.
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> Whether the decrease in traffic is due to the higher fare or to other causes I cannot say, but it is a fact, nevertheless, that the revenue has failed to increase as we had anticipated it would.

Jitney Dying Hard

Seattle "Parasites" Carry Their Case Against City to the State Supreme Court

W. R. Crawford, attorney for the jitney interests at Seattle, Wash., has made an offer to the city to dismiss the litigation against the city now pending in the courts, if the city will approve the proposed route schedule for the jitney buses outlined by the jitney commission just before election. The city utilities committee, to which the offer was made, however, has turned a deaf ear, and "indefinitely postponed" the measure.

At the election the city voters declared against the jitneys. Previous to the election the jitney owners objected to the schedule of routes proposed, but since the election their attitude has changed, inasmuch as the city voted against allowing them full rights to operate as they chose.

The right of the city to regulate the jitneys was upheld by the court refusing a permanent injunction against the enforcement of the city's jitney ordinance, but the victory was a hollow one, as the temporary restraining order remains in effect until the case is disposed of in the State Supreme Court.

Before the case was heard on its merits, the city made an effort to have the temporary restraining order dissolved, but this motion was denied. Had the temporary order been dissolved and the case then gone to trial on its merits, the city would not be in a position to enforce its regulation of the jitneys.

Three federal judges passed on the validity of every phase of the city's proposed ordinance regulating the jitneys before the application for a restraining order was filed in the Superior Court. They held that the city had every right under the law to carry out its regulation of the jitneys.

The whole litigation means that probably several months will elapse before the city will be in a position to proceed with its regulation of the jitneys as proposed in the ordinance.

"No-Accident" Week in Fort Wayne

R. N. Hemming, superintendent of transportation of the Indiana Service Corporation, Fort Wayne, Ind., was in active charge of the "No-Accident" week staged in Fort Wayne by the local Safety Council during the week of Nov. 29. Mr. Hemming is the chairman of the council. The week was advertised by means of posters placed in all the street cars, in downtown buildings and in all the industrial plants and by means of newspaper stories and advertisements. During the week the Boy Scouts distributed small cards and window shield stickers to the public to help along the movement. In speaking of the campaign Mr. Hemming said:

> The number of accidents in Fort Wayne and Allen County during the past year is appalling, compared with fatalities due to carelessness in other cities. In Allen County there were eighty-two fatal accidents during the period from Oct. 1, 1919, to Oct. 1, 1920, and that figure represents nearly one-thousandth of the total of 88,000 fatalities due to carelessness in all the United States. We hope by means of this campaign to prove to the public the hazards of carelessness and we also hope to induce a greater degree of safety on the part of the general public.

Transportation News Notes

Three Cents a Mile on Interurban.—The Auburn & Syracuse Electric Railroad, Auburn, N. Y., recently raised the fare on its interurban lines from a basis of 2.75 cents to one of 3 cents a mile. The company also raised the price of commutation and other reduced fare tickets.

City Sanctions Fare Increase.—The City Council of Charles City, Iowa, has approved an application of the Charles City Western Railway for permission to increase its cash fare within the city limits from 5 cents to 10 cents. The company proposes to sell fourteen tickets for $1.

Ten Cents on Maine Road.—The Portsmouth, Dover & York Street Railway, Portsmouth, N. H., on Nov. 1 raised the fare on its lines in Maine from 7 cents to 10 cents. The increase was made under authority of the Maine Public Utilities Commission. Tickets are sold at the rate of 6 cents each.

Grants Temporary Increase.—A tentative increase in fares from 7 to 8 cents has been allowed the North Alabama Traction Company, Albany, by the Alabama Public Service Commission. The higher rate will be in effect until a formal hearing is held in December, when the case will be finally decided.

"Safeties" in Kenosha.—The Wisconsin Gas & Electric Company introduced Birney one-man safety cars on its lines in Kenosha, Wis., on Nov. 15. It is planned to have the "safeties" furnish the base service, while the old type cars are to be used during rush hours to furnish supplementary service. Reports in the Kenosha newspapers indicate that the new cars have already won public favor.

Higher Newspaper Rates Asked.—Following increases in freight and passenger rates, the Philadelphia (Pa.) Rapid Transit Company has filed a new tariff with the State Public Service Commission increasing newspaper-carrying rates from 12 to 18 cents a hundred pounds, effective Dec. 19. The increase on newspapers completes the general advance that the company has effected in the last four months.

Asks More on Suburban Line.—A petition for an increase in fare from 8 to 10 cents on the Black Bridge-Venice division of the East St. Louis & Suburban Railway, East St. Louis, Ill., has been filed with the Illinois Public Utilities Commission. Service on this division was curtailed for about four months but was resumed recently. During the time it was suspended persons going to and from Venice paid from 20 to 25 cents for jitney rides.

Six Cents in El Paso.—The City Council at El Paso, Tex., has approved the application of the El Paso Electric Company for a 6-cent fare on its city lines. The Council first held a public meeting to obtain the views of the public on the proposal, and at this meeting practically no opposition to the fare increase was voiced. The company represented that it could not maintain the present service on the 5-cent fare, and that unless fares were increased, the service would have to be curtailed.

Conductor Freed of Murder Charge.—J. C. Knight, who on Oct. 12 shot and killed James M. Means, assistant superintendent of transportation of the Georgia Railway & Power Company, Atlanta, Ga., has been acquitted of a charge of murder by a jury in the Criminal Court at Atlanta. The shooting occurred while Mr. Means was reprimanding Knight, a conductor, who had admitted being short in his accounts. Knight based his defence on the claim that the slaying was accidental.

Bus Regulation Urged.—The Chamber of Commerce of Providence, R. I., has forwarded to the City Council a copy of the report of its committee on jitney regulations, made after a study of the local bus situation. The committee finds that the jitney service as at present operated is "extremely dangerous," and believes that the public should be safeguarded by the passage of a new ordinance. The report recommends the requirement of a bond for every person operating a jitney, limitation of operation to persons over twenty-one years of age who have passed an examination, and the establishment of routes and schedules.

More State Rates Raised.—The Interstate Commerce Commission on Nov. 26 rendered a decision in which it directed railroads operating in the State of Illinois to raise intrastate passenger fares 20 per cent. The commission on Dec. 1 ordered a 20 per cent increase in intra-state passenger fares in Wisconsin. The commission reaffirmed its recent action ordering intrastate passenger fares fixed by the New York Public Service Commission for the Second District should be increased to conform to the interstate rates. It asserted that its construction of the recent transportation act is not a violation of state rights. Fourteen railroads operating in Illinois on Nov. 29 obtained an injunction in the federal court restraining Attorney General Brundage and municipal and county officials in Chicago from enforcing state tariff restrictions. Justice Cropsey of the New York Supreme Court on Nov. 27 issued injunctions restraining the Long Island Railroad and other carriers from placing in effect the higher fares authorized by the Interstate Commerce authorized by the I. C. C.

Personal Mention

William H. Taylor Resigns

Fritz J. Frank, vice-president of the Iron Age Publishing Company, has been elected president of that company, following the resignation of William H. Taylor, who has been president and general manager for more than ten years.

Mr. Taylor has resigned because of ill health. He became connected with the *Iron Age* as general manager, after a group of publishers had acquired the ownership from David Williams. Mr. Taylor had been connected previously with various trade and engineering publications over a period of fifteen years, having for a time been vice-president of the McGraw Publishing Company, and, later, president of the Taylor Publishing Company of Chicago.

Fritz J. Frank, who succeeds Mr. Taylor, has been with the Iron Age Publishing Company since 1910, after an active association with other trade publications, among them *Colliery Engineer* and the *Mining and Scientific Press*. He has a wide acquaintance in the iron and steel and machinery trades, is experienced in business journalism, and is thoroughly committed to the traditions and standards of *Iron Age*.

Changes on the Chicago "L"

E. C. Noe, for many years general manager of the Chicago (Ill.) Elevated Railways, has been promoted to the office of vice-president of the several companies comprised in the system. The duties of the general manager will be assumed by Britton I. Budd, president. Active responsibility for operation of the roads will be assigned to B. J. Fallon, assistant general manager.

John Bauer, Consultant

John Bauer has established himself in New York as a consultant on finance, accounting and tax matters. From July, 1917, to December, 1920, he was chief of the division of accounts of the Public Service Commission for the First District of New York. Following his resignation from the Public Service Commission Mr. Bauer acted as expert adviser on transit matters in the office of the Corporation Counsel of New York City. Mr. Bauer received his technial training in economics and finance at Yale University. In 1908 he went to Cornell, where he served as instructor and then assistant professor in economics, lecturing on general economics, corporation finance and accounting. In 1914 he obtained a leave of absence from Cornell and joined the Public Service Commission for the First District temporarily, working more particularly on a revision of the uniform system of accounts. He also did a variety of analytical work in connection with rate cases, capitalization cases, rapid transit contracts, etc. He subsequently took charge of the newly created department of accounting, corporation finance and public utilities at Princeton University. Mr. Bauer is the author of numerous articles on finance, economics and accounting matters, some of which were contributed by him to the ELECTRIC RAILWAY JOURNAL.

Mr. Perry, President

Through an oversight in the composing room incident to the preparation of the issue of Nov. 20 for the press, the wrong portrait was published in connection with the biography of James A. Perry, the new president of the National Association of Railway and Utilities Commissioners. The correct portrait of Mr. Perry is published this week.

J. A. PERRY

Mr. Perry is a stanch advocate of vesting rate-making authority in the state commissions. He will probably play a prominent part in the campaign to be waged by the state regulatory bodies to preserve their powers from curtailment at the hands of the Interstate Commerce Commission. It is reported that the association may intervene in the legal actions now pending to test the right of the federal commission to fix intrastate rates.

Obituary

P. L. Utley, secretary, general manager and purchasing agent of the Escanaba (Mich.) Traction Company, died recently.

J. J. Regan, of the railway department of the General Electric Company, Schenectady, N. Y., died on Nov. 11. Mr. Regan was born in Schenectady in 1876. He received his education at the schools in that city and entered the employ of the General Electric Company at the age of eighteen years. For a number of years he was connected with the railway department of that company, and had a large acquaintance with men identified with railway interests.

B. Leighton Beale, secretary of the Boston (Mass.) Transit Department, died on Nov. 24. Mr. Beale became secretary of the Boston Transit Commission when it was organized in 1894. He served continuously in that capacity until it went out of existence in 1918. When, under the "constitution" act, it became the Boston Transit Department he remained its secretary, and was such at the time of his death. Mr. Beale was a newspaper man by profession. He was connected with a number of Boston dailies at one time or another, occupying positions all the way from reporter to city editor. He gave up journalism several years ago.

D. Levering Jones died of paralysis at his home in Philadelphia recently. Mr. Jones was a dominant figure in electric railway circles in Indiana from 1895 to 1910. He was president of the old Ft. Wayne & Wabash Valley Traction Company and chairman of the board of directors of the Ft. Wayne & Northern Indiana Traction Company until the company went into receivers' hands some years ago. At various times he was interested in the Indianapolis Street Railway, the city lines of Lafayette, the Indiana Union Traction Company, the Ohio Electric Railway, the Ft. Wayne & Wabash Valley lines and the Ft. Wayne & Northern Indiana Traction Company, now the Indiana Service Corporation.

Edgar Peckham, prominent as a manufacturer of trucks for electric railways during the early history of the industry in this country, died in London, of heart failure, on Sept. 22. For a number of years Mr. Peckham had been living in London, part of this time being engaged in the manufacture of trucks. Mr. Peckham was a native of Oneida County, N. Y., and while engaged in the truck business in this country, had his factory at Kingston, N. Y. He was one of the earliest to advocate the use of independent trucks as opposed to the former horse car running gear with the motor suspended from the car frame. The principal feature of the Peckham truck, as built for single-truck cars, was what was called the cantilever extension frame or the use of an extended spring base supported by a cantilever truss from underneath. The purpose of this construction was to reduce the oscillation of the car and at the same time to provide a better support for the end of the car, while retaining a short wheel base. Mr. Peckham moved from this country to England in 1904. He was eighty years of age.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Buying of Heater Repair Parts Not Large

Manufacturers Are in Good Shape to Meet the Demand—Back Orders for Heaters Catching Up

Following a good buying season for electric car heaters, manufacturers report that the buying of repair parts thus far, while fair, has not been up to the standard of other seasons. Apparently electric traction companies are not making repairs to heaters except where absolutely necessary, the inference being that tightness of money is to blame. Furthermore, on the buying of material for repair work there is a tendency to postpone ordering as long as possible, a circumstance which causes embarrassment to the heater manufacturer who must anticipate his needs for repair parts well in advance. On the other hand, late rush orders for completed heaters did not develop this year along in October or November.

Supply conditions of heater parts on the whole are favorable. The steel situation has eased up to such an extent that surplus stocks of the metal parts, such as screws, clips, sheets, etc., are in good shape. Resistance wire is also said to be in good shape. Shipments of porcelain, on the other hand, leave much to be desired, but by advance ordering manufacturers have accumulated a stock sufficient to care for customers' needs.

Up to this time manufacturers have been very busy turning out back orders for complete heaters, but just now production is beginning to catch up with unfilled orders.

Emergency Coal Order Vacated by I. C. C.

Preferential Transportation of Coal for Utilities and Priorities on Open-Top Cars Withdrawn

With the vacating by the Interstate Commerce Commission on Nov. 24 of service order No. 21 all preferential transportation of coal for utilities has been stopped. This order, which had been on the books since Oct. 8, superseded the general preferential order for utility coal and applied only to emergency cases. In setting the order aside the commission stated that "the emergency which caused the commission on the eighth day of October, A. D. 1920, to make and enter its service order No. 21 has in general been measurably relieved."

A few days later the I. C. C. cancelled order No. 20, the last of the open-top car coal transportation priority orders.

The Interstate Commerce Commission rescinded the priority order against the advice of many coal specialists. It is believed necessary to continue maximum production during December to insure against scant supplies later with attendant price increases.

The commission very evidently is of the opinion, however, that most of the open-top cars will continue in the coal trade despite the withdrawal of the order owing to the limited amounts of building and road materials which are shipped at this season of the year. In some quarters it is feared that the lack of open-top equipment during recent months has led to an accumulation of stocks of materials best handled in that type of car and that immediate advantage will be taken of the lifting of the order to make these shipments. It is pointed out, however, that should other commodities absorb an undue proportion of the open-top cars the commission would reinstate the order on short notice.

Steel Price Cut Expected to Stimulate Buying

Action of Certain Independent Mills in Lowering Prices to Meet Those of Steel Corporation Likely to Relieve Steel Situation

Following the announcement on Nov. 26 by the Jones & Laughlin Steel Company that its prices on bars, plates and structural shapes had been revised downward to meet the prices quoted by the United States Steel Corporation, which prices were those suggested at the conference of steel interests with the Industrial Board in March, 1919, there has been in the steel trade a general feeling of satisfaction. It is felt that this action on the part of this independent steel company will exert a stabilizing influence on the steel market, and that a readjustment in the trade will follow.

Some action was necessary to overcome the low level of steel buying and to avoid complete suspension of work in many plants. At the time of this writing, however, there has been little noticeable revival of buying, but it is expected that few days will go by before this condition is overcome and buying is resumed. While not all independent producers have met the full drop in prices announced by the one producer above, many mills have shown a recession to figures close to the bottom prices quoted.

The independent mills as a whole are working much below capacity, in some cases down to 60 per cent. It is probable that these mills will now receive some orders which had previously been given to the corporation but on which shipments were some distance off. This feature of prompt shipment on the part of the independent companies is likely to cause cancellation orders on the leading steel producer.

Certain independent prices on plates are quoted now at 2.65 cents, on structural shapes 2.45 cents and on bars 2.35 cents, Pittsburgh, while wire nails have dropped to $3.25 per keg. At the same time other of the independents have quotations much higher than these. Reductions in sheets have just been announced from some independents; blue annealed has gone to 4.05 cents base, black to 4.85 cents and galvanized to 6.20 cents. However, other interests are still quoting 5.50 cents for the black and 7 cents for galvanized.

Better Deliveries Help Railway Purchasing Agents

In meeting immediate needs, railway purchasing agents note general improvement in deliveries by both manufacturers and jobbers. Hand-to-mouth buying is practised throughout the traction industry, but the better shipments now available are tending to establish a fairly healthy cash business, especially in small supplies. A substantial volume of service must be maintained regardless of the present shrinkage in general business, and from the buyer's standpoint conditions are improving right along. The demand for supplies continues far above levels common to some less stable industries whose buying has fallen to a bare fraction of their normal.

For a long time the electrical supply jobber was overwhelmed with orders from industrial plants and central stations. Little attention was paid by some of these houses to the problems of electric railway material supply, probably because of its comparatively small volume and because of the precarious financial status of many traction companies. Now that the jobbers' sales forces are combing the field for orders, the purchasing agent who seeks service need not go far to find it. In the opinion of well-informed purchasing agents, the time is ripe for establishing new and better relations with the sales representatives of both manufacturer and jobber. Even small orders are treated with a new respect and current needs may be helpfully met by such orders in view of future price uncertainties, it is believed. The railway purchasing agent is not inclined to stock up extensively on supplies with the prospect of price recessions which many buyers still believe exists, and it is felt to be a wise policy to buy carefully and to take advantage of improving deliveries in cutting down idle investment in spare parts. A little cooperative sales effort on the part of the jobber, it is believed, especially in supplying material from stock for roads in the same general territory, would help in liquidating accumulated supplies and reduce the outlay needed by the companies to maintain the volume of service now necessary. Nor are the electric roads canceling orders as are some other buyers. These are the opinions of a leading purchaser of electric railway supplies and are suggestive of a better outlook.

Trolley Cord Quotations Lower in Soft Cotton Market

Recent declines in the raw cotton market—spot cotton being quoted in New York at 16.65 cents at this writing—have been reflected in lowering prices for trolley cord and bell cord. Within the past month reductions in the different grades of cord have amounted to approximately 25 per cent and new figures are being quoted almost weekly. According to the grade desired, trolley and bell cord can be purchased at prices ranging from approximately 75 cents to 95 cents a pound.

Buying in the trolley field is quiet and the building field is not providing anything like normal demand for either the weatherproof or plain braided cord. Stocks, consequently, are in good condition both in manufacturers' hands and in jobbers' hands and no difficulty is found in filling orders.

Low Cotton Affects Car Curtain Manufacturers

Present Light Demand Reflects Tendency to Await Drop in Prices—Production and Deliveries Improve

Sales of car curtains the past year have been good, but for some time past demand has been falling off as consumers are taking the attitude of waiting for lower prices. The buying of curtain material and parts for winter repair purposes, however, is said to have been as good as in other seasons. Steam road demand especially has been large in that respect.

Earlier this year the large buying of curtain material from other industries than railway, such as the automobile, for instance, was so heavy that it curtailed somewhat the supply of curtains. Trouble in obtaining metal fittings for curtains was also experienced. These conditions have now changed as curtain cancellations from automobile manufacturers were received in considerable volume and the metal situation has eased up. Combined with greater labor efficiency and a very plentiful supply of cotton, these factors have tended to improve deliveries of car curtains, and back orders which were numerous three or four months ago are now catching up.

At present deliveries can be made on curtains in about four weeks, according to representative manufacturers, with a variation at each extreme depending upon the class of material desired. There seems to be a decided tendency at present for electric railways to make their curtains serve a longer period than usual without making repairs.

Following their rate increases some time ago the buying of steam railroads for a time increased substantially. There is still considerable business in sight both from steam and electric lines, which will probably not be placed until the market reaches a firm basis. Even curtain manufacturers are buying on a hand-to-mouth basis owing to the situation in the cotton market. Some slumping of prices on the finished product is reported recently and at present, it is stated, the price tendency seems still to be downward.

New Woods Sought for Ties

The Pennsylvania Railroad, owing to unprecedented cost of railroad ties, it is announced, has decided to investigate the adaptability of the hard woods of Central and South America for this purpose. Normally the Pennsylvania system uses from 5,000,000 to 6,000,000 ties annually. The average net cost has risen fully 100 per cent since the beginning of the war. Furthermore, white oak, which the company considers the most desirable wood for ties, is becoming scarcer. Therefore the company has inquiries under way to determine the comparative cheapness and longevity of southern hard woods for railroad ties.

Rail Bonds and Contactor Parts Lower

With electrolytic copper being sold at a figure below that reached at any time since the opening of the war, it has brought down with it prices of certain of its products made for the most part of that metal. Copper has been sold in small amounts by dealers for spot delivery as low as 13.5 and 13.75 cents delivered, but little is available at that figure. Producers are holding

NEW YORK METAL MARKET PRICES

	Nov. 3, 1920	Dec. 1, 1920
Copper ingots, cents per lb	15.00	14 00
Copper wire base, cents per lb	17.50 to 18.00	17.00
Lead, cents per lb	7 25	5.50
Nickel, cents per lb	43 00	43.00
Zinc, cents per lb	7.40	6.00
Tin, cents per lb	39.50	33.25
Aluminum, 98 to 99 per cent, cents per lb	33.10	32.90

OLD METAL PRICES—NEW YORK

	Nov. 3, 1920	Dec. 1, 1920
Heavy copper, cents per lb	12 00 to 13 00	10 50 to 11 00
Light copper, cents per lb	10 00 to 10 50	8 50 to 9.00
Heavy brass, cents per lb	6 50 to 7 00	6 50 to 7 00
Zinc, cents per lb	4 00 to 4.50	3 25 to 3.50
Yellow brass, cents per lb	5 00 to 5.50	4 50 to 5.00
Lead, heavy, cents per lb	5.25 to 5.50	4 00 to 4.50
Steel car axles, Chicago, pet net ton	31 00 to 32 00	20 00 to 21 00
Old car wheels, Chicago, per gross ton	33 00 to 34 00	32.00 to 33 00
Steel rails (scrap) Chicago, per gross ton	22 50 to 23 50	19 00 to 20.00
Steel rails (rerolling), Chicago, gross ton	30 00 to 31 00	20 00 to 21.00
Machine shop turnings, Chicago, net ton	8 00 to 8.50	7 50 to 8 00

ELECTRIC RAILWAY MATERIAL PRICES

	Nov. 3, 1920	Dec. 1, 1920
Rubber-covered wire base, New York, cents per lb	23.00	23.00
Weatherproof wire (100 lb. lots), cents per lb	23.00	22.00
Standard Bessemer Steel Rails, per gross ton	45 00 to 63.00	45.00 to 55.00
Standard open hearth rails, per gross ton	47 00 to 65.00	47.00 to 57.00
T-rail, high (Shanghai), per gross ton, f.o b. mill	73 00	73 00
Rails, girder (grooved), per gross ton, f o b mill	[illegible]	[illegible]
Wire nails, Pittsburgh, cents per lb	3.25 to 4.50	3.25 to 4.25
Railroad spikes, drive, Pittsburgh base, cents per lb	4.25 to 5,25	3.25 to 4.25
Tie plates (flat type), cents per lb	4 00 to 5 00	3 00 to 3.75
Tie plates (brace type), cents per lb	4.00 to 5 00	3 00 to 3 75
Tie rods, Pittsburgh base, cents per lb.	6.50 to 7.00	6.00 to 6.50
Fish plates, cents per lb	4 00 to 5.00	3.25 to 4.25
Angle bars, cents per lb.	4.00 to 5.00	3.25 to 4.25
Rail bolts and nuts, Pittsburgh base, cents per lb	6 00 to 7.00	6.00 to 7.00
Steel bars, Pittsburgh, cents per lb	2.35 to 3.25	2.35 to 3.00
Sheet iron, black (24 gage), Pittsburgh, cents per lb	4.20 to 6.85	4.20 to 5.35
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb	5.25 to 8 05	5 25 to 6 55
Galvanized barbed wire, Pittsburgh, cents per lb	4 45	4.10 to 4.85

	Nov. 3, 1920	Dec 1, 1920
Galvanized wire, ordinary, Pittsburgh, cents per lb	3 95 to 4.70	3 95 to 4 45
Car window glass (single strength), first three brackets, A quality, New York, discount*	77%	77%
Car window glass (single strength), first three brackets, B quality, New York, discount	77%	77%
Car window glass (double strength, all sizes, A quality), New York, discount	79%	79%
Waste, wool (according to grade), cents per lb	15 to 21	15 to 21
Waste cotton (100 lb. bale), cents per lb	15 to 17½	15 to 17½
Asphalt, hot (150 tons minimum), per ton delivered	40 00	40.00
Asphalt, cold (150 tons minimum, pkgs. weighed in), per ton	42 50	36.00
Asphalt, filler, per ton	40.00	36.00
Cement, New York, per bbl	5 10	4 90
Linseed oil (raw, 5 bbl. lots), New York, per gal	1.05 to 1.07	.85
Linseed oil (boiled, 5 bbl. lots), New York, per gal	1 07 to 1 09	87
White lead (100 lb. keg), New York, cents per lb	15½	14 25
Turpentine (bbl. lots), New York, per gal.	1 17	95

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* These prices are f.o.b. works, with boxing charges extra.

to 14 cents as a minimum figure, with some of them not in the market at that price.

This has reflected on rail bonds, which are being quoted at another 5 points off, bringing the discount to 25 per cent as of Dec. 1, with the buying very quiet. Copper wire, net, at the mills is at 17 cents. At the same time from at least one source contactor fingers and segments are being quoted at about a 5 per cent lower figure since the last week in November.

Rolling Stock

The Los Angeles (Cal.) Railway, following the successful operation of forty-five safety cars on two of its lines, has received a recommendation from the Board of Public Utilities of that city to install fifty more Birney cars.

Consolidated Railway Company, Springfield, Ill., has installed the first of seventeen one-man cars and the others are expected soon. Officials stated that the use of the new cars will result in no reduction of the working force, but will reduce the present twelve-minute schedule to ten and nine minutes.

Track and Roadway

Los Angeles (Cal.) Railway.—The Hollywood Board of Trade has petitioned the Board of Public Utilities requesting the extension of the Vermont Avenue line from First Street to Griffith Park.

South Covington, Cincinnati & Newport Street Railway, South Covington, Ky.—The South Covington, Cincinnati & Newport Street Railway has been granted an extension of six months instead of a year for the use of Cincinnati streets north of Third Street because the Dixie Terminal will not be completed before that time.

Union Traction Company of Indiana, Anderson, Ind.—In order to eliminate two sharp curves and also the slow movement of interurban cars in Main Street through Summitville, Ind., the Union Traction Company is moving more than 4,000 ft. of its track one block west of Main Street. A compromise was effected with persons who at first refused an offer of the railway for a small tract of land, where curves in the line will be removed.

Pittsburg County Railway, McAlester, Okla.—The Pittsburg County Railway announces that it will extend the interurban line eastward to Fort Smith, Ark., in the near future. Preliminary surveys have already been made and financial arrangements are now being negotiated. The distance is approximately 80 miles. It is estimated that the line will cost about $2,500,000.

Minneapolis (Minn.) Street Railway.—An ordinance has been drafted on authority of the street railway committee directing the Minneapolis Street Railway to build its proposed East Twenty-fifth Street line in accordance with the plan originally suggested.

Duluth-Superior Traction Company, Duluth, Minn.—The Wisconsin Railway Commission has dismissed the petitions for a new railway on East Second Street from McBane to Hennepin Avenues and also a double-track from Wyoming Avenue to New York Avenue in Superior, Wis. The petition for the erection of these two lines is part of the recent demand made for the construction of new lines which also included a line on Twenty-first Street and extensions on the Tower Avenue line. These two lines were ordered constructed by the commission in the month of April, 1920. At this time the petitions for the Itasca line and the Billings Park line were considered.

Holyoke (Mass.) Street Railway.—The Holyoke Street Railway will very shortly begin the work of laying new ties and rails in Hitchcock Street. This improvement plan was brought about by the repeated complaints of residents of Hitchcock Street against the way in which the ground shakes and vibrates when trolleys pass.

Trade Notes

The J. G. Brill Company, Philadelphia, Pa., has arranged for the sale of equipment trust notes totaling $152,000 and $144,000 respectively.

The Walstrum Armature Works, Birmingham, Ala., have filed notice of increase in capital stock from $10,000 to $25,000.

W. McK. White, Western representative of the Columbia Machine Works & Malleable Iron Company, has moved his office from 6712 Cornell Avenue to 343 South Dearborn Street, Chicago.

The Kalamazoo Railway Supply Company, Kalamazoo, Mich., manufacturer of railway supplies, has filed notice of an increase in capital stock from $300,000 to $600,000.

The Bates Expanded Steel Truss Company, Chicago, Ill., has placed a contract for a one-story addition, 100 x 135 ft., to its plant on Forsythe Avenue, East Chicago, Ind.

The American Insulator Company, New Freedom, Pa., has acquired a site at Norfolk, Conn., on which it proposes to erect a two-story building. The proposed plant will give employment to about 500 people.

The Southern Car Wheel Company, Railway Exchange Building, St. Louis, Mo., contemplates the erection of a new plant on Marcus Avenue, fronting on the Terminal Railroad. The estimated cost will be more than $250,000.

The Worthington Pump & Machinery Corporation has completed plans for remodeling a building at North Bridget and East Dwight Streets, Holyoke, Mass., in connection with its local plant there. The cost is estimated to exceed $25,000.

Heywood Brothers & Wakefield Company, Wakefield, Mass., announces the appointment of Edward Buker as representative of its car-seat department, with offices and exhibits at 1415 Michigan Avenue, Chicago, Ill. Mr. Buker will handle sales of car seats and woven rattan car-seat webbing, as well as snow-sweeper rattan, in that territory.

Swedish Merchant Wants Cars.—An importer and commission merchant in Sweden desires to be placed in communication with manufacturers of narrow-gage electric motor cars for two or three passengers. Information may be had from the Bureau of Foreign and Domestic Commerce at Washington, D. C., by referring to No. 34067.

The Erie Electrical Equipment Company is seeking a location in Johnstown, Pa., to erect a foundry and factory for the manufacture of electrical and mechanical products, fittings to support high-tension and low-tension cables, busbars, insulator supports, switchboard panel fittings, etc. The company has opened an office at 620 Elder Street, Johnstown. F. S. Proudfort is chief engineer.

The Black & Decker Manufacturing Company, Towson Heights, Md., has recently increased its capitalization by $2,000,000. Of this amount $368,500 was subscribed by the employees. Since closing the books on the above issue so many more requests for subscriptions have been received that the company has decided to open up immediately another block of $150,000 for the benefit of the employees of the organization.

New Advertising Literature

Condensers.—The Elliott Company, Jeannette, Pa., has issued bulletin "C," covering its Elliott-Ehrhart condensers.

Elevators and Conveyors.—The Dodge Sales & Engineering Company, Mishawaka, Ind., has published a 160-page catalog describing the Dodge standardized elevators and conveyors.

Copper-Clad Steel.—"Putting the Strength of Steel Into Your Wires" is the title of a two-page leaflet issued by the Copper-Clad Steel Company, Rankin, Pa. (Braddock, Pa., post office).

Ballbearings.—"Langhaar Self-Adjusting Ballbearings" is the title of a thirty-two-page booklet issued by the Langhaar Ballbearing Company, Aurora, Ind., describing the "L-S-A" self-adjusting ballbearings.

Headlights.—"Mine Locomotive Headlights" is the subject of bulletin 7-A-C-1, which describes the new mine locomotive headlights for 23-watt to 94-watt lamps recently placed upon the market by the Westinghouse Electric & Manufacturing Company, George Cutter Works, South Bend, Ind.

Jacks.—The Duff Manufacturing Company, Pittsburgh, Pa., is distributing catalog No. 104, a 148-page book illustrating and describing the complete line of Duff lighting jacks.

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A Superintendent of Equipment sent in an inquiry for a hand brake for a freight car made in the railway company's shop.

A Peacock was dispatched in haste.

The master mechanic could not be convinced that such a small brake could hold a heavy freight car on a grade without air brakes.

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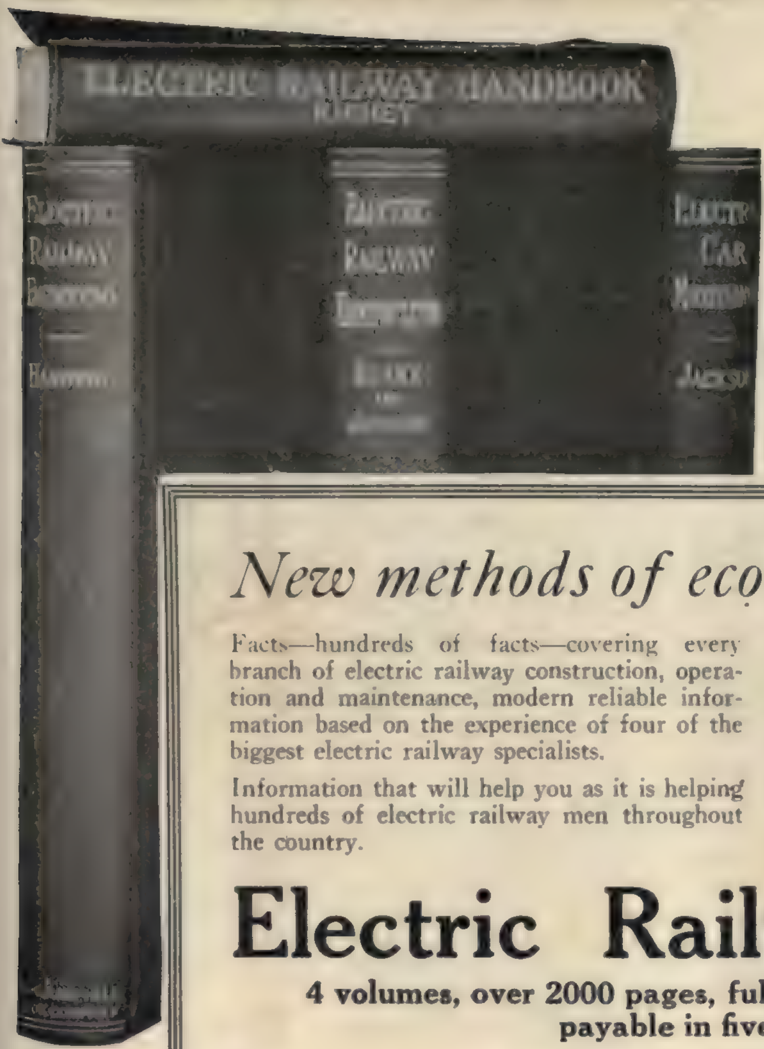
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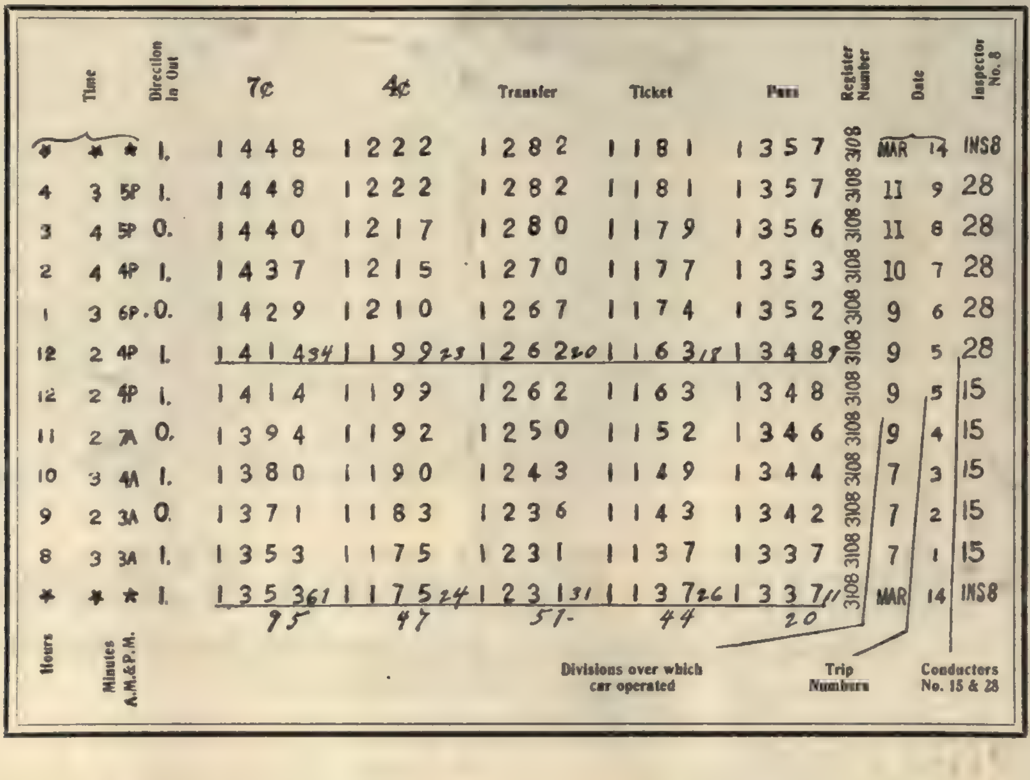
The Ohmer System



Time			Direction In Out	7¢	4¢	Transfer	Ticket	Pass	Register Number	Date		Inspector No. 8
*	*	*	I.	1448	1222	1282	1181	1357	3108	MAR	14	INS8
4	3	5P	I.	1448	1222	1282	1181	1357	3108	11	9	28
3	4	5P	O.	1440	1217	1280	1179	1356	3108	11	8	28
2	4	4P	I.	1437	1215	1270	1177	1353	3108	10	7	28
1	3	6P	O.	1429	1210	1267	1174	1352	3108	9	6	28
12	2	4P	I.	1414 34	1199 23	1262 20	1163 18	1348 9	3108	9	5	28
12	2	4P	I.	1414	1199	1262	1163	1348	3108	9	5	15
11	2	7A	O.	1394	1192	1250	1152	1346	3108	9	4	15
10	3	4A	I.	1380	1190	1243	1149	1344	3108	7	3	15
9	2	3A	O.	1371	1183	1236	1143	1342	3108	7	2	15
8	3	3A	I.	1353	1175	1231	1137	1337	3108	7	1	15
*	*	*	I.	1353 61	1175 24	1231 31	1137 26	1337 11	3108	MAR	14	INS8
				95	47	51-	44	20				
Hours	Minutes	A.M.&P.M.										

Divisions over which car operated

Trip Numbers

Conductors No. 15 & 28

The Ohmer System of fare protection gives you audible, visible, classified registrations and clean-cut detailed printed records. These things are essential unless you are willing to violate the principles of good business in the important matter of protecting your income.

The Ohmer System is quick and accurate, both as to fare collecting and fare accounting. It is adapted to all kinds of service. Through its fairness and businesslike simplicity it appeals to the best class of conductors and through the operation of the quickly compiled Ohmer System statistics, you are enabled to secure increasingly better standards of service from your men.

The Ohmer System can be applied to your property without tying up any of your capital. We bear the investment burden. Our contracts are sufficiently flexible to take care of changing conditions, increased fare rates, etc., and you need never fear being caught with a lot of obsolete devices on your hands.

Ohmer Fare Register Company

Dayton, Ohio

"TRIBLOC"

—*one of their tools*

Men accept the Ford Tribloc as one of their tools. Like wrench or crow bar, it is used when needed, with absolute confidence in its unfailing reliability.

Suspended from roller bearing steel plate trolleys, running on I-beam trackways, each FORD TRIBLOC becomes a mobile lifting and carrying unit, ready for instant use. It consumes no power—it requires no trained operator—it cannot "gag," slip, or give trouble.

Capacities: Half a ton to twenty—and more. Write us.

FORD CHAIN BLOCK CO.
2nd and Diamond Sts., Philadelphia, Pa.

Overseas Representatives:
Allied Machinery Company of America
51 Chambers St., New York, U. S. A.
Paris Brussels Turin Barcelona Rio de Janeiro

Notice this Loop Hand Chain Guide (patented). Your men can operate a TRIBLOC from *any* angle

2177-D

FORD TRIBLOC

INTERNATIONAL Fare Registers

Type R-5

Type R-10. Single Register.

Insure 100% Collections

ELECTRIC railway collections with various rates of cash fares handled by individual conductors, must be safeguarded by a simple and accurate registration. To be completely effective every fare collection system should have a final visible and audible fare registration on overhead registers.

Changing rates of fare, or odd cent fares make the necessity of checking passengers as well as money deposited increasingly important. A fare register operated by the foot when the fare is received, offers a sure method of checking the load against the receipts and is the most flexible method where rates of fare are changing.

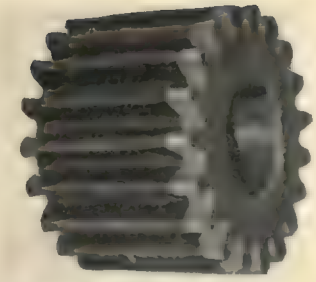
International Registers have been, and are today the standard equipment of the leading electric railways and street car systems of the country.

We invite correspondence regarding your fare collecting and registering problems.

The International Register Company

Manufacturers of Fare Registers and Railway Supplies, and General Selling Agents for HEEREN ENAMEL BADGES

Office and Factory: 15 So. Throop St., Chicago, Illinois



White paint illustrates softened end of teeth on motor side of pinion. This eliminates chipping.
(Patent pending)

"Tool Steel"

HELICALS

are just as superior
in quality as
"Tool Steel"
SPURS.

"Tool Steel" Helical gears—in sets, or interchangeable with other makes.

=*plus* service

—with these better bearings

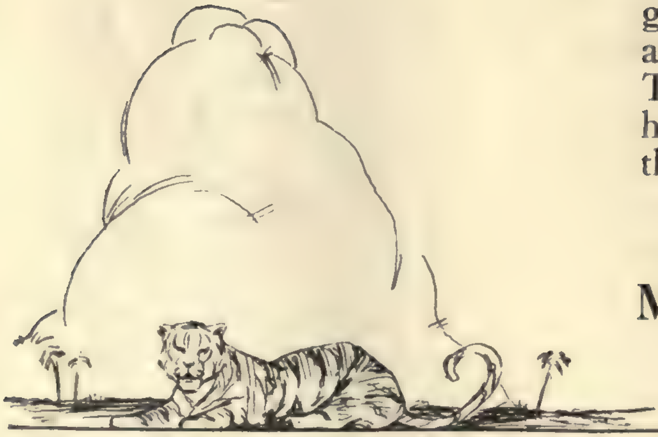
The cost of equipment is not measured by the purchase price. In the final analysis, service rendered tells the story of economical buying.

This is especially true of axle and armature bearings when defective material or workmanship mean heavy expenditures for bearing replacements, the rewinding of armature coils, etc.

Users of Tiger Bronze Axle and Armature Bearings are assured of maximum service. Tiger Bronze quality guarantees slow and even wear, correct bearing alignment, greater mileage and reduced wear upon axles and journals. The original cost of Tiger Bronze bearings may be a trifle higher, but in the long run they are by far the most economical.

Write for complete data.

More-Jones Brass & Metal Co.
ST. LOUIS, MISSOURI



"TIGER" BRONZE

AXLE and ARMATURE
BEARINGS

The Ideal Equipment for City or Interurban Cars

Agasote
(Trade Mark)
For Roofing—Headlining—Wainscoting

Pantasote
(Trade Mark)
For Curtains

Better Service at Lower Cost

The Chicago Surface Lines in specifying Agasote on its new trailers for headlining know the actual SERVICE that this material will give.

On this property, as well as on hundreds of others, there is ample evidence of the superiority of Pantasote curtains and Agasote roofing over all others.

Agasote for roofing will outwear wood many times. It is absolutely waterproof to start with and it stays that way.

In case of accident it is easily and rapidly patched.

Old-fashioned curtains wear out quickly. They are made of flimsy material, easily torn, stained and discolored.

Pantasote Curtains wear a great many times longer; are made tough and not easily torn. When washed they look as good as new.

RESULT

Economy ***Light-weight*** ***Durability***

THE PANTASOTE COMPANY

11 Broadway, N. Y. People's Gas Bldg., Chicago, Ill. 751 Monadnock Bldg., San Francisco, Calif.

49

The map above shows the location of the 49 foundries in the United States and Canada represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago 3
St. Louis 2
Buffalo 4
Pittsburg 2
Cleveland 2
Amherst N.S.
Montreal
Mich. City Ind.
Louisville.
Mt. Vernon Ill.
Ft Wayne. Ind
Birmingham
Atlanta
Savannah
Boston
Detroit
St. Paul.
Kansas City Kan
Denver
Tacoma
Rochester N.Y.
Sayre. Pa.
Lime Rock. Conn
Albany.
Toronto.
New Glasgow N.S.
Madison. Ill
Berwick Pa
Huntingdon. W. Va.
Wilmington Del
Houston Tex
Hannibal Mo
Reading Pa
Baltimore
Richmond Va.
Ft William Ont
St Thomas
Hamilton
Ramapo. N.Y.
Marshall Tex
Los Angeles

Capacity 20,000

CHILLED IRON WHEELS

Per Day

25 Million in Service

Association of Manufacturers of Chilled Car Wheels
847 McCormick Bldg. Chicago.

This book describes our complete line of carbon tool steels. *A copy will be mailed on request.*

MIDVALE STEEL AND ORDNANCE COMPANY
CAMBRIA STEEL COMPANY

General Sales Offices: WIDENER BUILDING, PHILADELPHIA, PA.

DISTRICT SALES OFFICES:
Atlanta Boston Chicago Cincinnati Cleveland Detroit New York Philadelphia Pittsburgh
San Francisco Salt Lake City Seattle St. Louis

SOLE EXPORT REPRESENTATIVE:
CONSOLIDATED STEEL CORPORATION, 165 Broadway, New York
All export inquiries should be sent to this address.

Series Number 42-1

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings　Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells　Steel Springs

BRAND *"The 'Standard' Brand on your material is an assurance of eventual economy."* BRAND

STANDARD STEEL WORKS CO.

GENERAL OFFICES:

500 NORTH BROAD ST., PHILADELPHIA, PA.

CHICAGO
ST. LOUIS
HAVANA, CUBA
ST. PAUL

RICHMOND
SAN FRANCISCO
NEW YORK
HOUSTON

MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

Bates One-Piece Steel Poles with Ornamental Lighting

This installation illustrates one of the possibilities of combining Artistic Bates Poles with ornamental lighting units.

The excessive number of poles required where trolley conductors and lighting units are installed on separate poles is not only decidedly inartistic, but is also a needless waste of good material. Of course, it is necessary that an artistic steel pole be used for such a combination of purposes.

The series lighting conductor is run from pole top to pole top eliminating the use of expensive, troublesome underground cable.

The use of Bates Permanent Steel poles with ornamental lights represents maximum economy and the utmost in art.

Bates Expanded Steel Truss Co.

208 South La Salle Street
CHICAGO, ILLINOIS

Victor 7210

for 70,000 Volt Service

This Insulator is built for 70,000 volts. That means you can depend on it to *safely* carry 70,000 Volts because it is a *Victor*.

LOCKE INSULATOR CORP.
Maryland Trust Bldg., Baltimore, Md.

You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

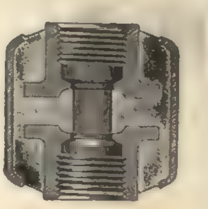
The Macallen Line

of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.

The Macallen Insulating Joint



Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.

May We Send Our Catalog?

TRADE MACALLEN MARK.

The Macallen Company

Macallen and Foundry Sts., Boston

TRADE MACALLEN MARK.

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2 cents per joint

is the cost of materials where OKONITE INSULATING and MANSON FRICTION Tapes are used.

Their use *insures* a perfect joint!

Why experiment and waste high priced labor on inferior tapes?

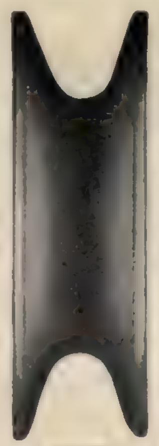
THE OKONITE COMPANY, PASSAIC, N. J.

Incorporated 1884

Central Electric Co., Chicago, Ill., General Western Agents

Pettingell-Andrews Co., Boston, Mass. Novelty Electric Co., Philadelphia, Pa.
F. D. Lawrence Co., Cincinnati, O.

OKONITE
TRADE MARK



"U"

Speed and Safety

will result from the constant use of Bayonet Equipment. Renewals made instantly.

Bayonet Special Trolley Wheels

are made from the highest grade metal and are hand turned, insuring greatest accuracy and balance. Reputation was gained by competitive tests.

Bayonet Detachable Trolley Harps

are the only trolley harps with which you can change from wheel to sleet cutter or to a new wheel in ten seconds. No tools required on top of the car. Inspections, repairs, adjustments and lubricating done at work bench later on when no schedules are being held up.

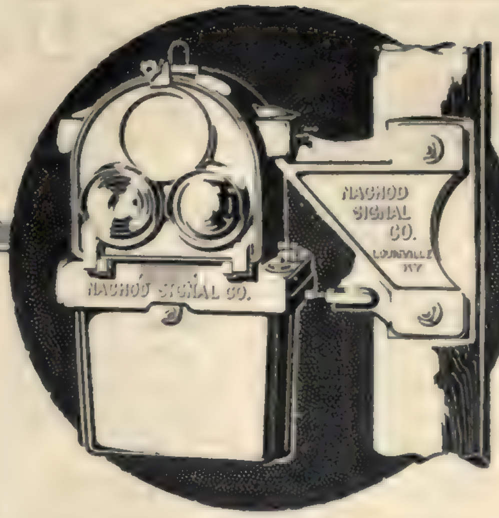
Bayonet Trolley Base with Detachable Pole Clamp

is the only trolley clamp made on which the trolley pole can be changed in 30 seconds and the wheel be in perfect alignment with the wire. No tools are required to do this job. It prevents schedules being delayed. A uniform wire pressure at all angles of the pole is obtained, thus saving on your overhead, wheel and wire.

Bayonet Sleet Cutters

have no superiors when it comes to cutting ice from the wire. Both rigid and semi-rotary types furnished.

Bayonet Trolley Harp Co.
Springfield, Ohio



This Road Needed Them; What About Yours?

A two-hundred-mile electric railway in Pennsylvania has come to depend so largely upon Nachod Signals that if they were suddenly removed, service would be prostrated. And yet this company *did* operate without them.

NACHOD SIGNALS

The company referred to has been gradually increasing its equipment of Nachod Signals during the past ten years until it has now obtained complete protection for all single track, with more than one hundred of these signals in use.

The signal maintenance is of a high type and the cost per signal extremely low. It has been found that Nachod Signals are of immense benefit in increasing traffic, preventing needless delays, checking the dispatcher's work and contributing in many ways to safe operation. Of one block on a single-track bridge it was said: "If those signals were removed there would be a strike."

If your road is not receiving the benefits of Nachod Signals, we will gladly tell you more about them. Ask for Catalogue 719. Nachod Signal Co., Inc., Louisville, Ky. Manufacturers of Automatic Signals, Highway Crossing Bells and Automatic Headway Recorders.

NACHOD *spells* SAFETY

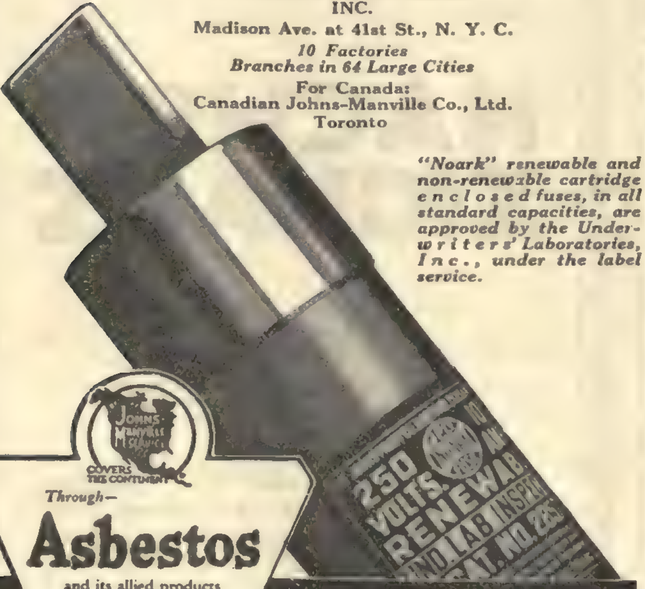
Positive action

THE desirable features that are inherent in the "Noark" fuse, are the result of care in design, manufacture and inspection. They mean positive action.

They are the result of care that refuses to take a chance where the safety of electrical apparatus is concerned — care that enables you to put complete reliance in a renewable fuse—the "Noark."

"Noark" Fuses and all other Johns-Manville packaged Electrical Materials are distributed strictly through distributor-dealer channels on a basis that gives full protection to all concerned. Dealers can get all details from their distributor. Distributors, for samples and complete information, should apply to the Electrical Department of the nearest Johns-Manville Branch.

JOHNS-MANVILLE,
INC.
Madison Ave. at 41st St., N. Y. C.
10 Factories
Branches in 64 Large Cities
For Canada:
Canadian Johns-Manville Co., Ltd.
Toronto



"Noark" renewable and non-renewable cartridge enclosed fuses, in all standard capacities, are approved by the Underwriters' Laboratories, Inc., under the label service.

Johns-Manville Service Covers the Continent

Through—

Asbestos

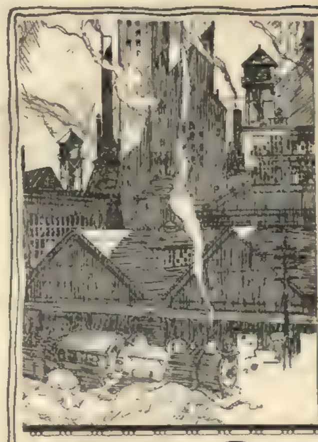
and its allied products

JOHNS-MANVILLE
Serves in Conservation

Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products

JOHNS MANVILLE

ELECTRICAL MATERIALS



Ferrule Type, Economy Fuse with Economy "Drop Out" Renewal Link.

ECONOMY *renewable* FUSES

Progressive industries using electrical energy obtain more dependable protection to lives, property and machinery—at less cost—when they discard "one time" fuse equipment for

Economy renewable Fuses

The famous Economy "Drop Out" renewal link cuts annual fuse maintenance costs 80%.

Knife Blade Type Economy Fuse

It is the least expensive and the only portion destroyed when an Economy Fuse blows.

Economy "Drop Out" Renewal Links invariably operate at rated capacity. They are inexpensive—a reserved stock kept always on hand represents but a small investment.

The Fuse itself—fibre cartridge, end caps and the winged washer which locks the link securely in place—is used again and again.

The merits of Economy Fuses have been recognized officially, for they were the first line using inexpensive bare renewal links for restoring blown fuses to their original efficiency to be approved in all capacities by the Underwriters' Laboratories.

Your plant needs Economy Fuses.

For sale by all leading electrical jobbers and dealers.

Economy Fuse & Mfg. Co.
Chicago U. S. A.

Also made in Canada at Montreal.

High Speed Money Changers

should be included in your standard equipment

Time cannot be bought so why not save as much as possible. You can eliminate many of the unnecessary delays—supply your ocnductors with HIGH SPEED MONEY CHANGERS which are indispensable when once in use.

The rapid and accurate handling of change is to your advantage where there is a congestion of heavy traffic.

Complete descriptive circulars and price lists of the many combinations produced are at your disposal upon request.

J. L. GALEF, 75 Chambers Street, New York City

Exclusive Manufacturers' Selling Agent

Time Saved Means Money Earned This Winter

Sleet Wheel

You can't tell whether you'll have sleet storms and heavy weather but you can be ready for it by putting in a supply of Anderson sleet wheels and sleet cutters now. They will help you to maintain schedules.

Catalog 8 describes it.
Where shall we send yours?

Sleet Cutter

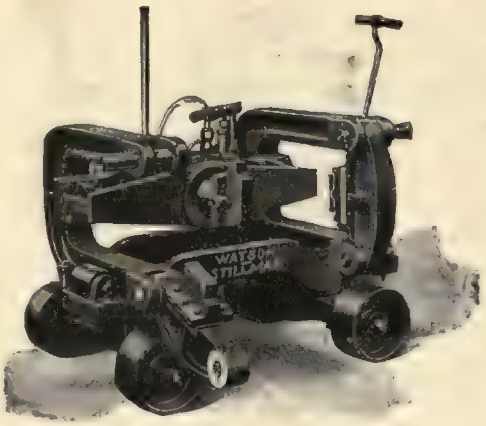
Albert & J. M. Anderson Mfg. Co.

289-293 A Street **(Established 1877)** **Boston, Mass., U. S. A.**

BRANCHES:

New York, 135 Broadway
Chicago, 105 So. Dearborn Street
Philadelphia, 429 Real Estate Trust Bldg.
London, E. C., 48 Milton Street

You Can Bend Rails Quickly and Economically With a Watson-Stillman Hydraulic Rail Bender



Hydraulic Portable Rail Bender

The portable rail bender shown herewith is designed for use on the road. It is equipped with interchangeable formed bending blocks, and will make any bend without buckling. The hinged yoke permits the rails to be put in sidewise. It can also be used for other heavy bending.

We build many other handy tools for the railway shop. Such as: Crank Pin Presses, Wheel Presses, Forcing Presses, Forging Presses, Jacks, Pit Jacks, Punches, Shears, Pumps, Accumulators, etc.

Write for Catalogs.

The Watson-Stillman Co., 46 Church St., New York
Chicago: McCormick Building Philadelphia: Widener Building

Conductor's Seat

THIS Conductor's seat is made of malleable iron castings—built strong and substantial for the hardest kind of service.

The standard design is made to fit one inch pipe stanchion. The seat is made of best quality maple. The whole equipment is collapsible and will fold flat against any surface, occupying a minimum of space.

Motorman's Seat

Our Motorman's seat is of similar construction with the additional feature, that the seat itself is raised and lowered on a square thread screw.

The Advance Manufacturing and Tool Co.
Cleveland, Ohio

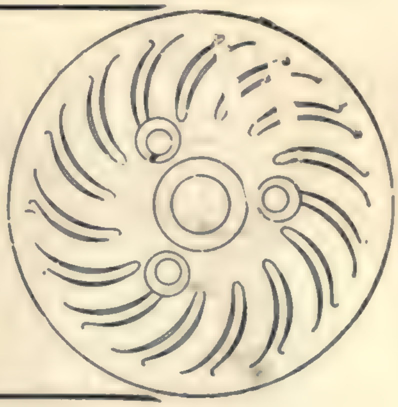
HENSLEY

Hensley Trolley Wheel performance is guaranteed. We shall send any railway as many wheels as it desires with a positive understanding that they may be returned to us for credit even after being worn out if all we claim about the Hensley trolley wheel does not result in the test.

Hensley better-made trolley wheels of "Resisto" Bronze permit us to guarantee its performance.

Hensley Trolley & Mfg. Co.
Detroit, Mich.

Griffin Wheel
Company
McCormick Building
Chicago, Ill.



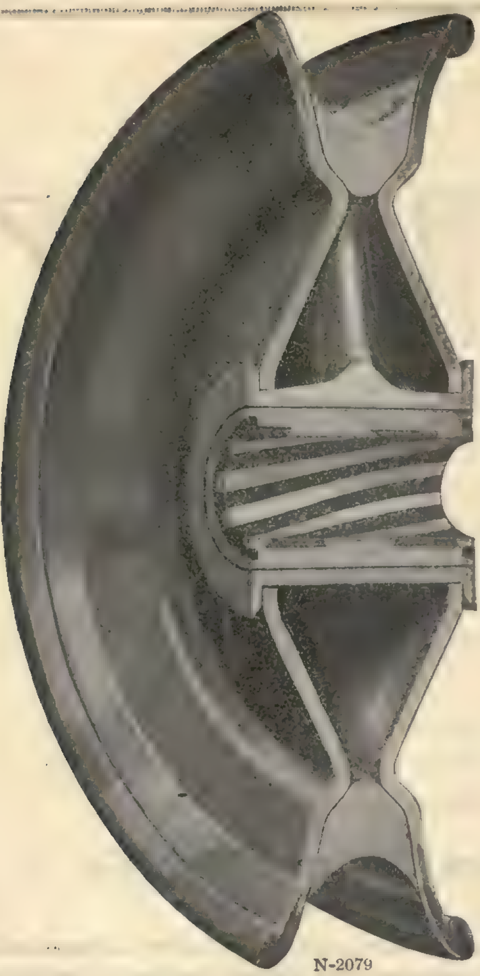
GRIFFIN F. C. S. WHEELS

For Street and Interurban Railways

All of our plants have adequate facilities for fitting wheels to axles

FOUNDRIES:

Chicago Detroit Boston St. Paul Tacoma
Denver Kansas City Los Angeles



N-2079

Nuttall

IDEAL

The name tells the whole story.

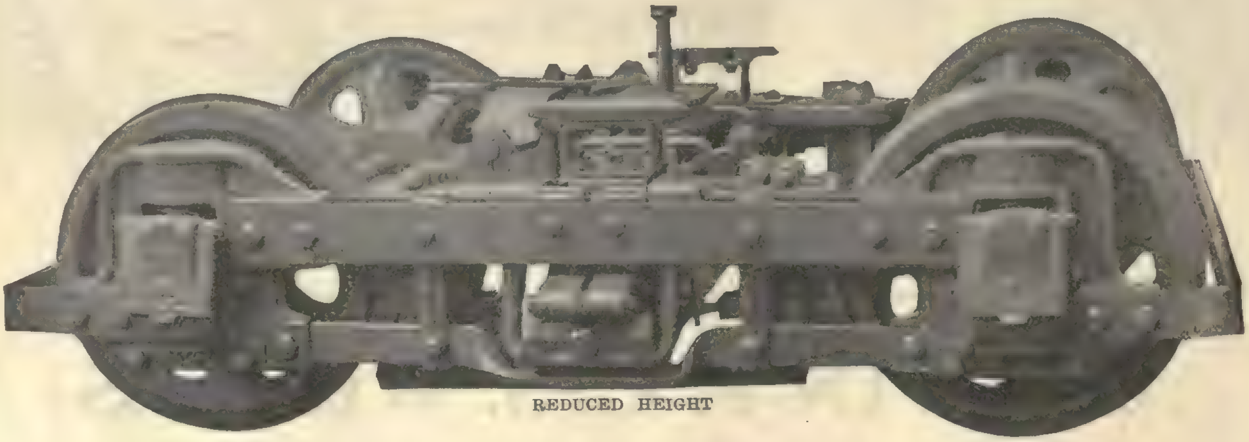
The Ideal wheel is ideal in service as well as in its name.

Lightness, strength, wear resistance and perfect balance are the foremost of the qualities which make it the "Ideal" trolley wheel.

Form Number	Outside Diameter	Weight
40-A	4.5 in.	34 oz.
40-B	4.5 in.	34 oz.
60-A	6 in.	50 oz.
60-B	6 in.	51 oz.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

R. H.
TAYLOR REDUCED HEIGHT TRUCK



REDUCED HEIGHT

TAYLOR R. H. TRUCK

Mounted on 26-in. Wheels with Springs Over Journal Boxes.
Designed to Mount Centre and End Entrance Cars Low Down.

SWING MOTION AND FULL ELLIPTIC SPRINGS

Wheel Base 5 ft. 2 in. For Car Bodies weighing 16,000 to 22,000 lb. Motors Inside Hung.

EASY RIDING

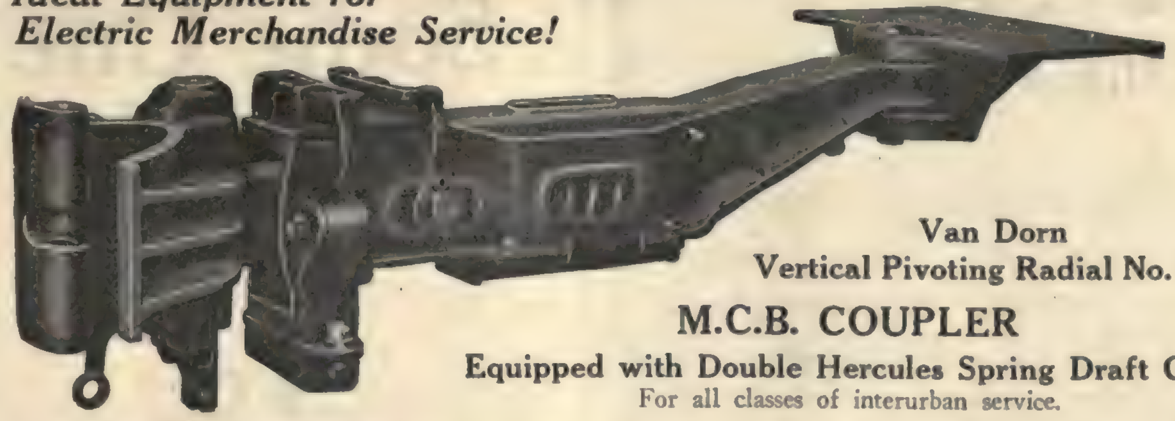
Journals 3¾ x 7 M. C. B. Type. Height from Rail to Body Bolster, 22¾ in. Brakes Inside Hung.

TAYLOR ELECTRIC TRUCK CO., TROY, N.Y.

SPECIFICATIONS ON REQUEST **Established 1892** **SEND FOR PORTFOLIO**

VAN DORN RADIAL M.C.B. COUPLERS

Ideal Equipment for
Electric Merchandise Service!



Van Dorn
Vertical Pivoting Radial No. 796

M.C.B. COUPLER

Equipped with Double Hercules Spring Draft Gear
For all classes of interurban service.

That "there is a great and profitable field for electric railways in handling freight" was a conclusion reached by the committee on express and freight traffic at the recent convention of the American Electric Railway Association.

With respect to interline traffic of this kind, it is necessary for the various cars of different lines to couple with each other and also with steam railroad cars. That, of course, ncessitates M.C.B. Couplers.

The VAN DORN No. 796 M.C.B. Coupler illustrated above is especially suitable for this service, as it interchanges with all standard M.C.B. Couplers on both steam and electric railroads. This Coupler is of the radial, vertical pivoting type, is well designed, and is capable of taking care of large trains of cars. Extended guard arm and butting wall greatly facilitates coupling and prevent buckling. Deep knuckles permit a wide, free vertical movement. Double Hercules Spring Draft Gear is effective in absorbing shocks and makes train move as one car. This equipment will operate perfectly on curves of 35-ft. radius.

Let us tell you more about this Coupler. Your request for information will imply no obligation.

VAN DORN COUPLER COMPANY
2325 South Paulina Street, Chicago, Illinois

Brake Shoes
A. E. R. A. Standards

Diamond "S" Steel Back is the Best Type

Standard
Patterns

for

SAFETY
CAR

D-67 for Narrow Treads
D-87 for Wide Treads

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago Chattanooga, Tenn.

TROLLEY Catchers and Trolley Retrievers made by C. I. Earll, York, Pa., are well designed, well built, simple and effective. They are easy to operate and maintain.

Send for sample and try them out

C. I. EARLL, York, Pa.

Every Step of the Way

from the quarry where the ore is mined to the finished product, Carnegie Steel Company controls the manufacture of its every section. This control makes possible strict adherence to the best practice in every stage of manufacture.

This should mean much to the purchaser. Whether he wishes plates, shapes, bars, rails, wheels, angles, tees, zees, mine timbers, oil derricks, cross ties, gear blanks, etc., he may be assured of their uniformly good quality.

It is with a cordial spirit of cooperation that your wants are regarded. This spirit has built up for the Carnegie organization its reputation as a good company with which to deal.

Experienced engineers are ever ready to discuss your steel problems with you.

Carnegie Steel Company

General Offices: Carnegie Building, Pittsburgh, Pa.

1387

Some One Wants To Buy

the equipment or machinery that you are not using. This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it

before depreciation scraps it.

The Searchlight Section is helping others—
Let it help you also

6057

Aluminum Company of America
General Sales Office
2400 Oliver Bldg., Pittsburgh, Pa.

PRODUCERS *of* ALUMINUM
Manufacturers of
ELECTRICAL CONDUCTORS
for
Industrial, Railway and Commercial Power Distribution
also
Ingot, Sheet, Tubing, Rod, Rivets, Moulding, Extruded Shapes, Bronze Powder and Foil
also
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LATIN AMERICA
Aluminum Co. of South America, Pittsburgh, Pa.

UNION STATION
KANSAS CITY
KERITE
used throughout for power lighting, signalling and interlocking
KERITE INSULATED WIRE & CABLE COMPANY
NEW YORK
CHICAGO

ROEBLING Trolley Wire
INSULATED WIRES AND CABLES
WELDING WIRE WIRE STRAND
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

Peirce Forged Steel Pins with Drawn Separable Thimbles
Your best insurance against insulator breakage
Hubbard & Company
PITTSBURGH, PA.

1870-EUGENE F. PHILLIPS-1882.
AMERICAN ELECTRICAL WORKS
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
(Single, Duplex and Three Phase)
TROLLEY WIRE
(Round, Grooved or Figure 8)
BARE COPPER WIRES AND CABLES
MAGNET WIRE
(Cotton or Asbestos)
Americanite Rubber Covered Wire
Incandescent Lamp Cord
Galvanized Iron and Steel Wire and Strand
AMERICAN ELECTRICAL WORKS
Phillipsdale, R. I.
Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way; San Francisco, 612 Howard; Seattle, 100 1st Ave. So.

Chapman Automatic Signals
Charles N. Wood Co., Boston

COPPER CLAD STEEL COMPANY
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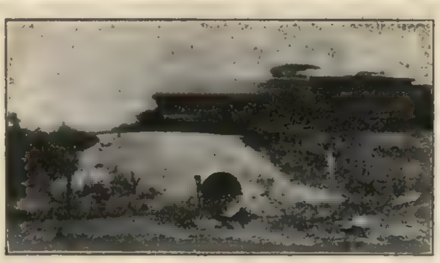

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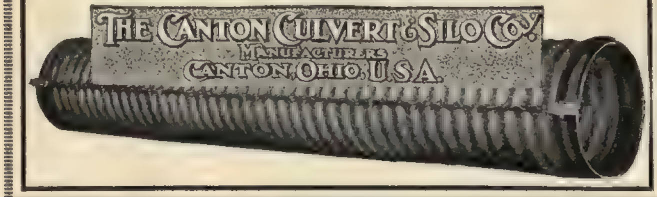
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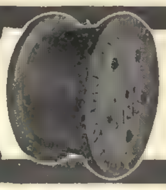

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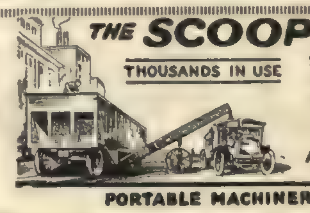

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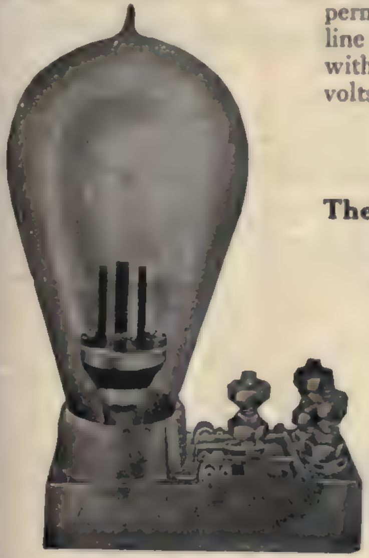

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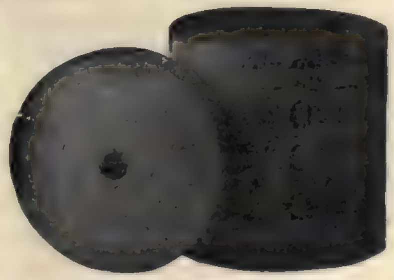

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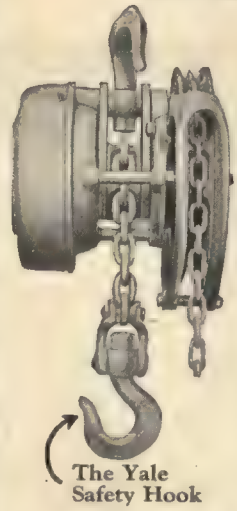

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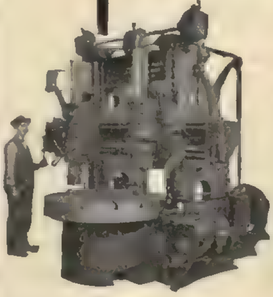

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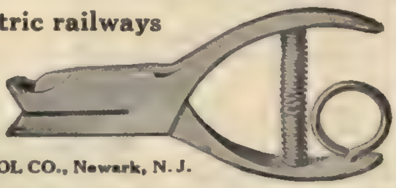

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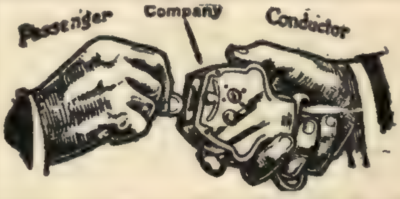

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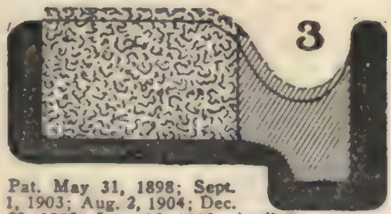

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If only the wheel tread needs truing this type of

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Wheel Truing Brake Shoe

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MARRIED man wanted to act as traveling freight auditor, also young man for statistical department. Reply with full information to F. Pantel, Auditor, Chicago Lake Shore & South Bend Railway Company.

SUPERINTENDENT wanted for interurban line. Must be familiar with transportation, maintenance, and electric light and power business. Apply, F. L. Butler, Manager Winnipeg Electric Railway Co., Winnipeg, Canada.

POSITIONS VACANT

TIMETABLE maker and depot clerk wanted for street railway in Eastern city. Must first qualify as competent motorman under peculiar local conditions. Give full particulars when replying. P-793, Elec. Ry. Journal.

YOUNG man wanted with technical training. Experience in railway distribution desirable. Motive Power Department, U. R. & E. Co., Baltimore, Md.

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4	G.E. 201	75 H.P.
8	G.E. 205	100 H.P.
10	G.E. 210	65 H.P.

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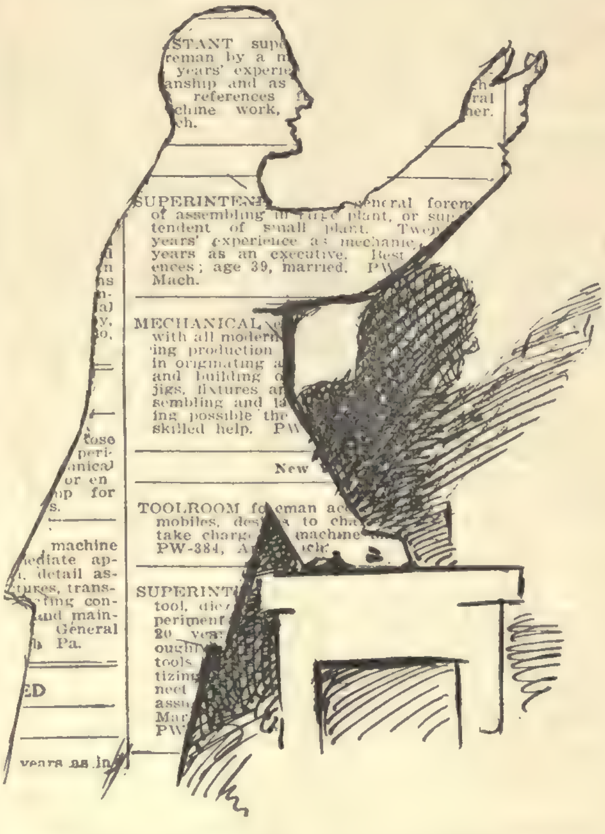

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Civil Service Opportunities
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Desk Room For Rent
Desk Room Wanted
Educational
Employment Agencies
Foreign Business
For Exchange
For Rent
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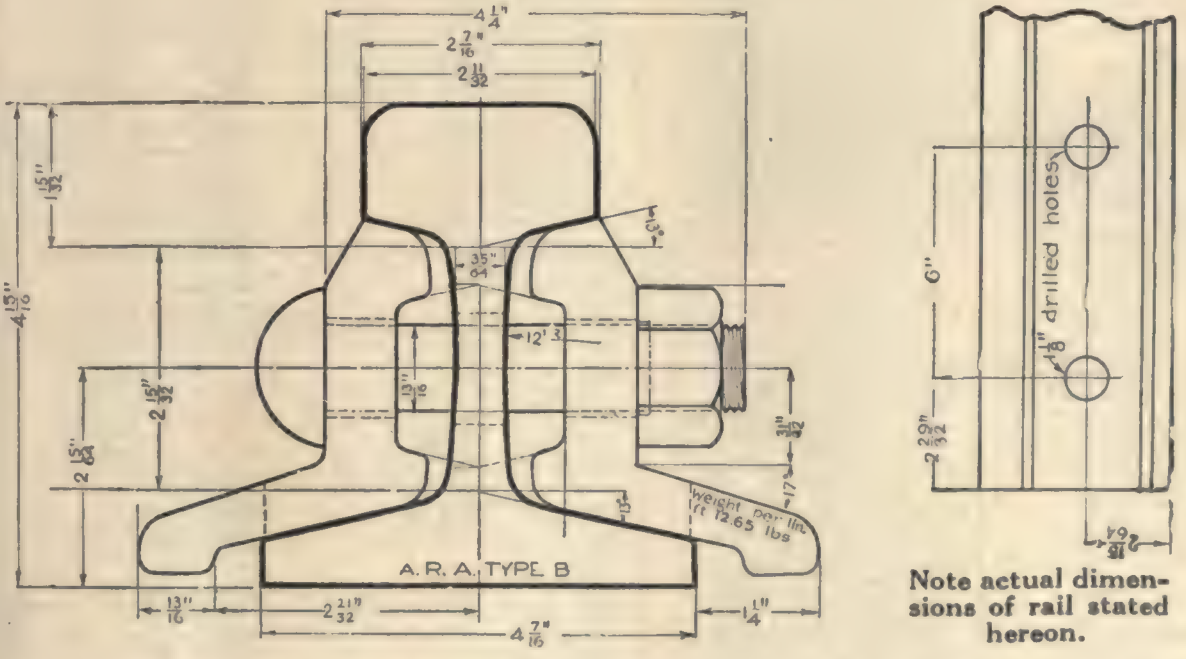

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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  - Collier, Inc., Barron G.
- **Air Receivers**
  - Ingersoll-Rand Co.
- **Air Aftercoolers**
  - Ingersoll-Rand Co.
- **Ammeters**
  - Weston Elec'l Instrument Co.
- **Anchors, Guy**
  - Electric Service Supplies Co.
  - Ohio Brass Co.
  - Westinghouse Elec. & M. Co.
- **Angle Bars**
  - Lackawanna Steel Co.
- **Ash Storage Tanks, Cast Iron**
  - Green Engineering Company
- **Automobile and Buses**
  - Brill Co., The J. G.
- **Axle Straighteners**
  - Columbia M. W. & M. I. Co.
- **Axles, Car Wheel**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Cambria Steel Co.
  - Carnegie Steel Co.
  - Midvale Steel & Ordnance Co.
  - Standard Steel Works Co.
  - St. Louis Car Co.
  - Taylor Electric Truck Co.
  - Westinghouse Elec. & M. Co.
- **Babbitt Metal**
  - More-Jones B. & M. Co.
- **Babbitting Devices**
  - Columbia M. W. & M. I. Co.
- **Badges and Buttons**
  - Electric Service Supplies Co.
  - International Register Co., The
- **Bankers & Brokers**
  - Coal & Iron National Bank
- Batteries, Dry
  - Johns-Manville Co., H. W.
- **Batteries, Storage**
  - Electric Storage Battery Co.
- **Bearings and Bearing Metals**
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Eureka Co.
  - General Electric Co.
  - More-Jones Brass & Metal Co.
  - St. Louis Car Co.
  - Taylor Electric Truck Co.
  - Westinghouse Elec. & M. Co.
- **Bearings, Center and Roller Side**
  - Stucki Co., A.
- **Bells and Gongs**
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Electric Service Supplies Co.
  - St. Louis Car Co.
- **Benders, Rail**
  - Niles-Bement-Pond Co.
  - Watson-Stillman Co.
  - Zelnicker, Walter A., Supply Co. Inc.
- **Boilers**
  - Babcock & Wilcox Co.
- **Boiler Tubes**
  - National Tube Co.
- **Bond Testers**
  - American Steel & Wire Co.
  - Rail Welding & Bonding Co.
- **Bonding Apparatus**
  - American Steel & Wire Co.
  - Electric Service Supplies Co.
  - Ohio Brass Co.
  - Rail Welding & Bonding Co.
- **Bonds, Rail**
  - American Steel & Wire Co.
  - Copper Clad Steel Co.
  - Electric Service Supplies Co.
  - General Electric Co.
  - Johns-Manville Co., H. W.
  - Ohio Brass Co.
  - Rail Welding & Bonding Co.
  - Westinghouse Elec. & M. Co.
- Book Publishers
  - McGraw-Hill Book Co., Inc.
- **Boring Tools, Car Wheel**
  - Niles-Bement-Pond Co
- **Boxes—Junction and Outlet**
  - National Metal Molding Co.
- **Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)**
  - Bates Expanded Steel Truss Co.
  - Creaghead Eng. Co.
  - Electric Railway Equipment Co.
  - Electric Service Supplies Co.
  - Hubbard & Co.
  - Ohio Brass Co.
- Brake Adjusters
  - National Railway Appliance Co.
  - Westinghouse Traction Brake Co.
- **Brake Shoes**
  - Amer. Brake Shoe & Fdry. Co.
  - Barbour-Stockwell Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - St. Louis Car Co.
  - Taylor Electric Truck Co.
  - Wheel Truing Brake Shoe Co.
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  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - National Brake Co.
  - Safety Car Devices Co.
  - St. Louis Car Co.
  - Taylor Electric Truck Co.
  - Westinghouse Traction Brake Co.
- **Bricks, Fire**
  - Green Engineering Co.
- **Brushes, Carbon**
  - General Electric Co.
  - Jeandron, W. J.
  - Morganite Brush Co.
  - United States Graphite Co.
  - Westinghouse Elec. & M. Co.
- **Brushes, Graphite**
  - United States Graphite Co.
- **Brush Holders**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
  - Eureka Co.
- **Buckets**
  - Blaw-Knox Co.
- **Bushings, Case Hardened & Manganese**
  - Bemis Car Truck Co.
  - National Metal Molding Co.
- **Bushings, Graphite & Wooden**
  - Bound Brook Oilless Bearing Co.
- **Cables. (See Wires and Cables)**
- **Carbon Brushes. (See Brushes, Carbon)**
- **Car Panel Safety Switches**
  - Westinghouse Elec. & Mfg. Co.
- **Cars, Dump**
  - Differential Car Co.
- **Cars, Passenger, Freight, Express, etc.**
  - American Car Co.
  - Brill Co., The J. G.
  - Cambria Steel Co.
  - Kuhlman Car Co., G. C.
  - McGuire-Cummings Mfg. Co.
  - Midvale Steel & Ordnance Co.
  - National Railway Appliance Co.
  - Thomas, Perley A.
  - Wason Mfg. Co.
- **Cars, Second Hand**
  - Electric Equipment Co.
- **Car, Self-Propelled**
  - Electric Storage Battery Co.
  - General Electric Co.
- **Castings, Brass, Composition or Copper**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
  - Eureka Co.
  - More-Jones Brass & Metal Co.
- **Castings, Funnel**
  - Wharton, Jr. & Co., Inc., Wm.
- **Castings, Gray Iron and Steel**
  - American Steel Foundries
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Standard Steel Works Co.
  - St. Louis Car Co.
  - Wharton, Jr. & Co., Inc., Wm.
- **Castings, Malleable and Brass**
  - Amer. Brake Shoe & Fdry. Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - St. Louis Car Co.
- **Catchers and Retrievers, Trolley**
  - Earll, Chas. I.
  - Electric Service Supplies Co.
  - Ohio Brass Co.
  - Wood Co., Chas. N.
- Change Carriers
  - L. F. Galef
- **Circuit Breakers**
  - General Electric Co.
  - Westinghouse Elec. & Mfg. Co
- **Clamps and Connectors for Wires and Cables**
  - Anderson Mfg. Co., A. & J. M.
  - Electric Railway Equipment Co.
  - Electric Service Supplies Co.
  - Eureka Co.
  - General Electric Co.
  - Hubbard & Co.
  - Ohio Brass Co
  - Westinghouse Elec. & Mfg. Co.
- **Cleaners and Scrapers Track—(See also Snow-Plows, Sweepers and Brooms)**
  - Brill Co., The J. G.
  - Ohio Brass Co.
- **Cleats**
  - National Metal Molding Co.
- **Clusters and Sockets**
  - General Electric Co.
- **Coal and Ash Handling—(See Conveying and Hoisting Machinery)**
- **Coil Banding and Winding Machines**
  - Columbia M. W. & M. I. Co.
  - Electric Service Supplies Co.
- **Coils, Armature and Field**
  - Cleveland Armature Works
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Independent Lamp & Wire Co.
  - Westinghouse Elec. & M. Co.
- **Coils, Choke and Kicking**
  - Electric Service Supplies Co.
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Coin-Counting Machines**
  - Electric Service Supplies Co.
  - International Register Co., The
  - Johnson Fare Box Co.
- **Commutator Slotters**
  - Electric Service Supplies Co.
  - General Electric Co.
  - Westinghouse Elec. & Mfg. Co.
- **Commutator Truing Devices**
  - General Electric Co.
- **Commutators or Parts**
  - Cameron Electrical Mfg. Co.
  - Cleveland Armature Works
  - Columbia M. W. & M. I. Co.
  - Eureka Co.
  - General Electric Co.
  - Westinghouse Elec. & Mfg. Co.
- **Compressors, Air**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Ingersoll-Rand Co.
  - Westinghouse Trac. B. Co
- **Compressors, Gas**
  - Ingersoll-Rand Co
- **Concrete Mixers**
  - Blaw-Knox Co.
- **Condensers**
  - General Electric Co.
  - Schutte & Koerting Co.
  - Westinghouse Elec. & Mfg. Co.
- Condensor Papers
  - Irvington Varnish & Insulator Co.
- **Conduit Fittings**
  - Chicago Fuse Mfg. Co.
  - National Metal Molding Co.
- **Conduits, Underground**
  - Johns-Manville Co., H. W.
  - Standard Underground Cable Co.
- **Connectors, Solderless**
  - Westinghouse Elec. & Mfg. Co.
- **Controller Fingers**
  - Eureka Co.
  - Russell Mfg. Co.
- **Controllers or Parts**
  - Columbia M. W. & M. I. Co.
  - Eureka Co.
  - General Electric Co
  - Johns-Manville Co., H. W.
  - Russell Mfg. Co.
  - Westinghouse Elec. & Mfg. Co.
- **Controller Regulators**
  - Electric Service Supplies Co.
- **Controlling Systems**
  - General Electric Co.
  - Westinghouse Elec. & Mfg. Co.
- **Converters, Rotary**
  - General Electric Co.
  - Westinghouse Elec. & Mfg. Co.
- **Conveyors, Belt**
  - Portable Machinery Co.
- **Conveyors, Coal & Ash**
  - Green Eng. Co.
  - Portable Machinery Co.
- **Conveyors, Portable**
  - Portable Machinery Co.
- **Conveying and Hoisting Machinery**
  - Columbia M. W. & M. I. Co.
  - Green Engrg. Co.
- **Copper Wire**
  - Anaconda Copper Mining Co.
  - Copper Clad Steel Co.
- **Cord, Bell, Trolley, Register, etc.**
  - Brill Co., The J. G.
  - Electric Service Supplies Co
  - International Register Co., The
  - Roeblings Sons Co., John A
  - Samson Cordage Works
- **Cord Connectors and Couplers**
  - Electric Service Supplies Co
  - Samson Cordage Works
  - Wood Co., Chas. N.
- **Couplers, Car**
  - Brill Co., The J. G.
  - Ohio Brass Co.
  - Van Dorn Coupler Co.
  - Westinghouse Trac. B. Co
- **Cranes**
  - Niles-Bement-Pond Co.
  - Thew Automatic Shovel Co.
  - Toledo Bridge & Crane Co., The
- **Creosote**
  - Barrett Co., The
- **Creosoting. (See Wood Preservatives)**
- **Cross Arms. (See Brackets)**
- **Crossing Foundations**
  - International Steel Tie Co.
- **Crossings, Frogs and Switches**
  - Wharton, Jr. & Co., Inc., Wm
- **Crossing Signals. (See Signals, Crossing)**
- **Crossings, Track. (See Track, Special Work)**
- **Culverts**
  - Canton Culvert & Silo Co.
  - Stark Rolling Mill Co.
- **Curtains and Curtain Fixtures**
  - Brill Co., The J. G.
  - Electric Service Supplies Co
  - Pantasote Co.
- **Cutouts**
  - Chicago Fuse Mfg. Co.
- **Dealers' Machinery**
  - Archer & Baldwin
  - Cleveland Armature Wks.
  - Electric Equipment Co.
  - Foster Co., L. B.
  - Griswold Machine Co., Geo. M.
  - Hyman Michaels Co.
  - Zelnicker Supply Co., Inc., Walter A.
- **Derailing Devices. (See also Track Work)**
  - Cleveland Frog & Crossing Co.
- **Destination Signs**
  - Columbia M. W. & M. I. Co.
  - Creaghead Eng. Co.
  - Electric Service Supplies Co.
- **Detective Service**
  - Wish Service, P. Edward
- **Dogs, Lathe**
  - Williams & Co., J. H.
- **Door Operating Devices**
  - Consolidated Car Heating Co.
  - National Pneumatic Co., Inc.
  - Safety Car Devices Co.
- **Doors and Door Fixtures**
  - Brill Co., The J. G.
  - General Electric Co.
- **Doors, Folding Vestibule**
  - National Pneumatic Co., Inc.
- **Draft Rigging. (See Couplers)**
- **Drills, Rock**
  - Ingersoll-Rand Co.
- **Drills, Track**
  - American Steel & Wire Co.
  - Electric Service Supplies Co
  - Niles-Bement-Pond Co.
  - Ohio Brass Co.
- **Drinking Cups, Sanitary Paper**
  - Individual Drinking Cup Co., Inc
- **Dryers, Sand**
  - Electric Service Supplies Co.
  - Zelnicker Supply Co., Walter A. Inc.
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  - Roebling's Sons Co., J. A
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  - Allison & Co., J. E.
  - Archbold-Brady Co.
  - Arnold Co., The
  - Byllesby & Co., H. M.
  - Clark Management Corp., E. W
  - Drum & Co., A. L.
  - Engel & Hevener
  - Feustel, Robert M.
  - Ford, Bacon & Davis
  - Hemphill & Wells
  - Holst, Englehardt W.
  - Jackson, Walter
  - Jacobs & Co., J. L.
  - Kelly Cook & Co.
  - Parsons, Klapp, Brinkerhoff & Douglas
  - Republic Engineers, Inc.
  - Richey, Albert S.
  - Sanderson & Porter
  - Sargent & Lundy
  - Scofield Engineering Co.
  - Stone & Webster
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  - Ingersoll-Rand Co.
  - Westinghouse Elec. & Mfg. Co.
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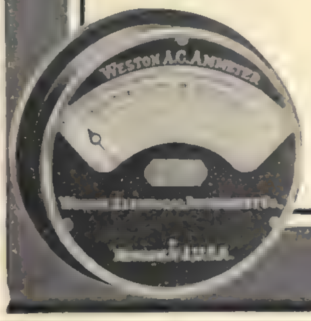

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- Cleveland Fare Box Co.
- Economy Electric Devices Co.
- Johnson Fare Box Co.
- National Railway Appliance Co.
- Ohmer Fare Register Co.

Feed Water Heating
- Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
- American Steel & Wire Co.

Fenders and Wheel Guards
- Brill Co., The J. G.
- Cleveland Fare Box Co.
- Consolidated Car Fender Co.
- Electric Service Supplies Co.
- Star Brass Works.

Fibre and Fibre Tubing
- Continental Fibre Co.
- Johns-Manville Co., H. W.
- Westinghouse Elec. & Mfg. Co.

Field Coils. (See Coils)

Filters, Water
- Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus
- Johns-Manville Co., H. W.

Flaxlinum Insulation
- National Railway Appliance Co.

Floodlights
- Electric Service Supplies Co.

Flooring Composition
- American Mason Safety Tread Co.

Forgings
- Carnegie Steel Co.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- Standard Steel Works Co.
- Williams & Co., J. H.

Frogs, Track. (See Track Work)

Fuses and Fuse Boxes
- Chicago Fuse Mfg. Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Johns-Manville Co., H. W.
- Westinghouse Elec. & Mfg. Co.
- Williams & Co., J. H.

Fuses, Refillable
- Columbia M. W. & M. I. Co.
- Economy Fuse Mfg. Co.
- General Electric Co.

Gages, Oil and Water
- Ohio Brass Co.

Gaskets
- Power Specialty Co.
- Westinghouse Traction Brake Co.

Gas-Electric Cars
- General Electric Co.

Gas Producers
- Westinghouse Elec. & Mfg. Co.

Gates, Car
- Brill Co., The J. G.

Gear Blanks
- Carnegie Steel Co.
- Standard Steel Works Co.

Gear Cases
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Westinghouse Elec. & Mfg. Co.

Gears and Pinions
- Bemis Car Truck Co
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- General Electric Co.
- National Railway Appliance Co.
- Nuttall Co. R. D
- Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
- General Electric Co.

Generators
- English Electric Co., Ltd.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Gongs. (See Bells and Gongs)

Graphite
- Morganite Brush Co.

Grates, Chain
- Green Eng. Co.

Greases. (See Lubricants)

Grinders and Grinding Supplies
- Metal & Thermit Corp.
- Railway Track-work Co.

Grinding Blocks and Wheels
- Railway Track-work Co.

Guards, Trolley
- Electric Service Supplies Co.
- Ohio Brass Co.

Harps, Trolley
- Anderson M. Co., A. & J. M.
- Bayonet Trolley Harp Co.
- Electric Service Supplies Co.
- Hensley Trolley & Mfg. Co.
- More-Jones B. & M. Co.
- Nuttall Co., R. D.
- Star Brass Works

Headlights
- Electric Service Supplies Co.
- General Electric Co.
- Ohio Brass Co.
- St. Louis Car Co.

Headlining
- Pantasote Co.

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- Consolidated Car Heating Co.
- Economy Electric Devices Co.
- Gold Car Heating & Lighting Co
- National Railway Appliance Co
- Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
- Cooper Heater Co.
- Smith Heater Co., Peter

Heaters, Car (Stove)
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- Smith Heater Co., Peter

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- Columbia M. W. & M. I. Co.
- Ford-Chain Block Co.
- Niles-Bement-Pond Co.
- Yale & Towne Mfg. Co.

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- Ingersoll-Rand Co.

Hose, Bridges
- Ohio Brass Co.

Hydraulic Machinery
- Niles-Bement-Pond Co.
- Watson-Stillman Co.

Injectors
- Schutte & Koerting Co.

Inspection
- Electrical Testing Lab's

Instruments, Measuring, Testing and Recording
- Economy Electric Devices Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.
- Weston Elec'l Instrument Co.

Insulating Cloth, Paper and Tape
- Anchor Webbing Co.
- General Electric Co.
- Hope Webbing Co.
- Johns-Manville Co., H. W.
- Okonite Co., The
- Standard Underground Cable Co.
- U. S. Rubber Co.
- Westinghouse Elec. & Mfg. Co.

Insulating Machinery
- American Insulating Machinery Co.

Insulating Varnishes
- Irvington Varnish & Insulator Co.

Insulation. (See also Paints)
- Anderson M. Co., A. & J. M.
- Drew Electric & Mfg. Co.
- Electric Ry. Equipment Co.
- Electric Service Supplies Co.
- General Electric Co.
- Johns-Manville Co., H. W.
- Mitchell-Rand Mfg. Co.
- Okonite Co., The
- U. S. Rubber Co.
- Westinghouse Elec. & Mfg. Co.

Insulators. (See also Line Material)
- Anderson M. Co., A. & J. M.
- Creaghead Engineering Co.
- Drew Electric & Mfg. Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- General Electric Co.
- Johns-Manville Co., H. W.
- Locke Insulator Mfg. Co.
- Macallen Co., The
- Ohio Brass Co.
- Thomas & Sons Co., R.
- Westinghouse Elec. & Mfg. Co.

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- Electric Service Supplies Co.
- Hubbard & Co.

Insulators, Section
- Flood City Mfg. Co.

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- Brill Co., The J. G.
- Buckeye Jack Mfg. Co.
- Columbia M. W. & M. I. Co.
- National Ry. Appliance Co.
- Watson-Stillman Co.

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- Carnegie Steel Co
- Lackawanna Steel Co.
- Rail Joint Co., The
- Zelnicker Supply Company, Inc., Walter A.

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- Bemis Car Truck Co.
- Brill Co., J. G.

Junction Boxes
- Standard Underground Cable Co.

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- Electric Testing Lab's

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- Anderson M. Co., A. & J. M.
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

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- Anderson M. Co., A. & J. M.
- General Electric Co.
- National Electric Specialty Co.
- Westinghouse Elec. & Mfg. Co.

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- Ohio Brass Co.

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- Williams & Co., J. H.

Lathes, Car Wheel
- Niles-Bement-Pond Co.

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- General Electric Co.
- Ohio Brass Co
- Westinghouse Elec. & Mfg. Co.

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- Archbold Brady Co.
- Columbia M. W. & M. I. Co.
- Creaghead Eng. Co.
- Drew Electric & Mfg. Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- English Electric Co., Ltd.
- Eureka Co.
- General Electric Co.
- Hubbard & Co.
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- Macallen Co., The
- More-Jones B. & M. Co.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

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- Texas Co., The

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- Galena-Signal Oil Co.
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- Niles-Bement-Pond Co.
- Watson-Stillman Co.

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- Electric Service Supplies Co.

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- Barrett Co., The

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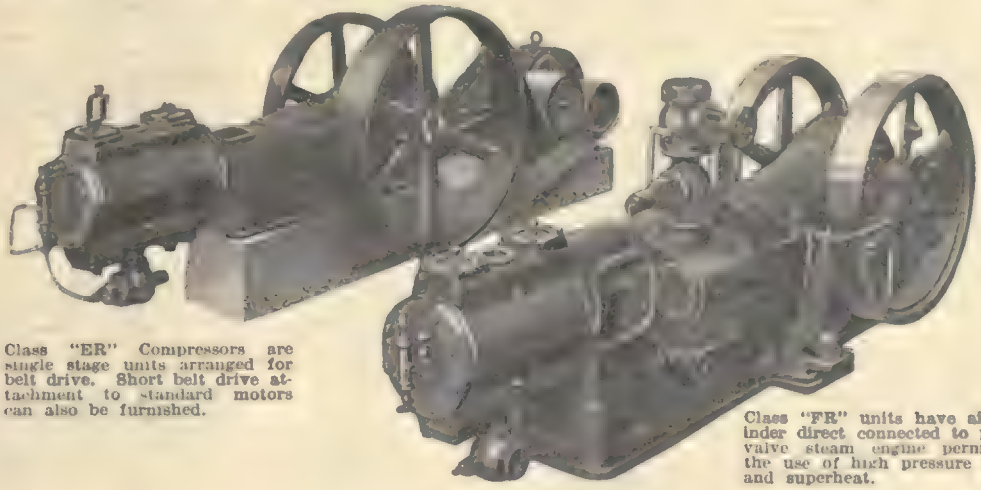

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- More-Jones B. & M. Co.
- Nuttall Co., R. D.
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- Ohio Brass Co.
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- American Steel & Wire Co.
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- Copper Clad Steel Co.
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CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

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"HONEYCOMB" AND "ROUND JET" VENTILATORS
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Rail Bonds and Trolley Line Specialties

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Felling the Western red cedar in the woods of the great Pacific Slope.

Peeling, scaling and inspecting Western red cedar poles in woods, Washington.

Manufacturing the cedar pole.

Poles awaiting cars for shipment to concentration yards.

Barrett B

Carbosota
Grade-One Liquid
Creosote Oil

A Pole Story

THESE original photographs show the whole production of creosoted (butt-treated) cedar poles.

Decay is largely responsible for the present extensive reconstruction of transmission lines. Unless preservative treatment is adopted the same experience will be repeated until the pole supply is exhausted.

Carbosoted cedar poles have become the standard for the best type of transmission line because of their natural suitability and the permanence of the Carbosota treatment as a protection against decay.

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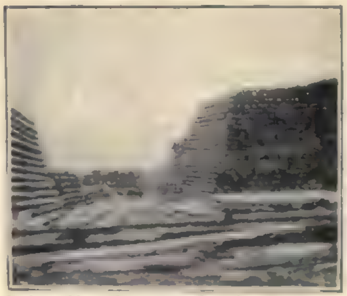
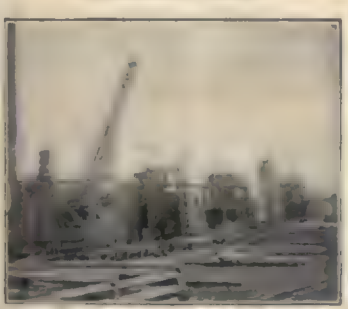
Western red cedar poles, 100 ft. long, awaiting unloading at Everett, Wash.

S. S. William Chatham ready to cast off at Everett with largest cargo of poles ever exported from U. S.

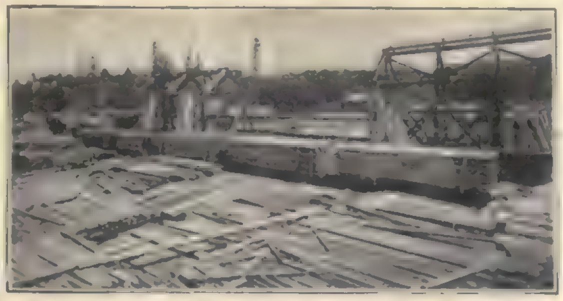


Poles piled for seasoning in concentration yard.

Trainload of butt-treated Western red cedar poles leaving treating plant.



Open Tank process creosoting plant of the Western Pole Preservers, Sandpoint, Idaho.



5 cars butt-treated Western red cedar poles after loading from treating tank. National Pole Co., Everett, Wash.

One of the Open Tank process pole creosoting plants of Baxter & Jordan, Wilmington, Calif.

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DREW MOTORMEN'S SAFETY MIRRORS

Eliminate Accidents

Send for catalogue No. 18

DREW ELECTRIC & MFG. CO.
Collamer Ave. and Nickel Plate Railroad, Cleveland, O.

MASON SAFETY TREAD—Lead or carborundum filled; non-slippery; prevents accidents; cuts out damage suits.
KARBOLITH CAR FLOORING—For steel cars; is sanitary, light weight, fire proof, non-slippery.
STANWOOD STEPS—Self-cleaning, non-slippery, light.
Over six million feet used without accident being reported within the knowledge of manufacturer. Our products used on all leading railroads on cars and stations. For details address
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Joseph T. Ryerson & Son, General Western Distributors.

UNIVERSAL ANTI-SLIP TREADS

cars and station steps.

Universal Safety Tread Company
40 Court St., Boston, Mass.

PS HEATERS

Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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1725 Mt. Elliott Ave., Detroit, Mich.

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost

The Cooper Heater Company
Carlisle, Pa.

Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

CONSOLIDATED CAR HEATING CO.
ALBANY, NEW YORK, CHICAGO

Naraka

Naraka, the Hindu demon king, had 16,100 wives and eight principal queens. Naraka was a born collector, but it got him into trouble —

Krishna, his cup bearer, killed him.

Krishna then took Naraka's wives and so successfully multiplied himself by magic that each of the 16,108 imagined that she had him for her very own !

But such magic is no longer in vogue, and the average brush manufacturer who claims that his particular brush is the one which can successfully take care of any of the 16,108 station troubles is only deceiving those whom he ought to be serving. How much better the Morganite way of looking into the trouble first and then prescribing a brush which is specifically designed for the service !

Don't place your confidence in "Krishna" brushes and then wonder why you have continued trouble —

Send for a Morganite engineer and be safe !

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131 Eastern Ave., Toronto, Ontario, Canada

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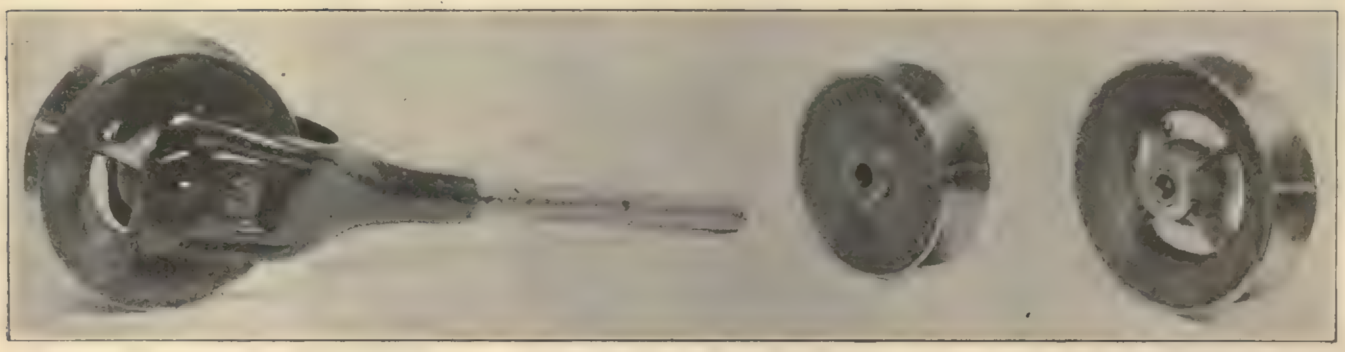

Trolley Wheels and Harps that rank as Aristocrats

They are the thoroughbreds of their kind. Quality is bred in the bone with them, in the shape of metal—good metal, metal especially developed and perfected for this important service. Long wear and good lubrication you may assume as a matter of course—and with these things, the elimination of high maintenance and tie ups. Other progressive roads know and depend on Columbia products. We are prepared to serve you.

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- Armature and axle straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car Hoists
- Car Replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and axle bearings
- Armature and field coils
- Bearings (axle and armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, rigging, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or malleable iron)
- Grid resisters
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

The Place For Birney Safety Cars

1. On heavy traveled lines in all-day service and supplemented during peak periods with large capacity front-entrance center-exit cars.
2. On light traveled lines where an improved service with shorter headways will stimulate car riding.
3. On suburban lines under a shorter headway schedule than is maintained by other types of cars.
4. On minimum service lines where the franchise demands some service.

BIRNEY
TRADE MARK
SAFETY
CAR

1. On Heavy Traveled Lines

The Birney Safety Car is an all-day car. It enables a railway company to increase revenue and reduce operating expenses so that the non-peak periods are profitable instead of a drain on the peak period revenue.

An all-day Birney Safety Car service, supplemented during the peak periods, if the travel requires it, with large-capacity cars with wide front-entrance and center-exits will furnish adequate transportation that is profitable to the operating company and at the same time favorably impresses the car riders.

Memo

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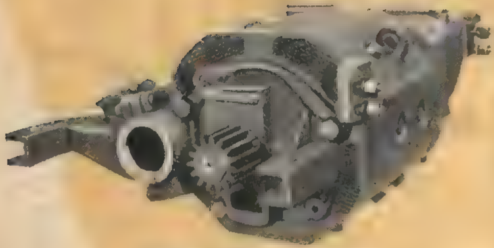
OVER

2700

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.

The building of machinery to secure greater motor power within the same car space is an accomplishment of exceptional importance in electric railroading.

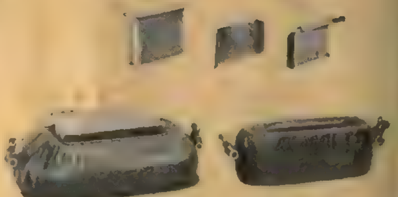


G-E 247 Ventilated Motor

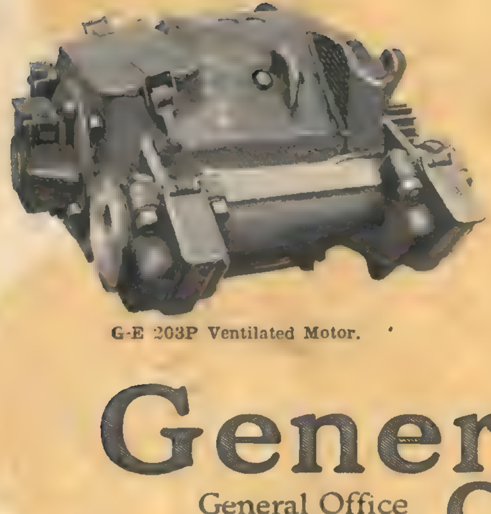
Make Your Present Cars Do More Work

Commutating poles and self-ventilation were not unknown to the earliest inventors of electric railway motors. But it was not until General Electric Company engineering was asked to meet the severe conditions encountered in congested city service that these principles were converted into successful practice.

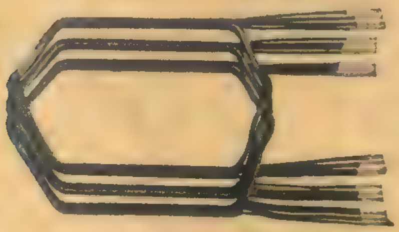
These two improvements incorporated in the modern ventilated commutating pole motor produces higher output per pound of weight.



Field Coils and Pole Pieces as Supplied When Ordered from Catalogue.



G-E 203P Ventilated Motor.



Armature Coils as Prepared for Supply Shipments.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

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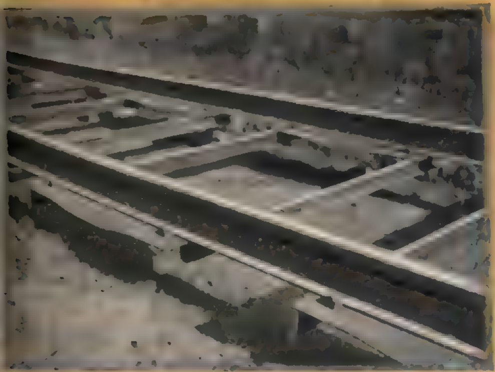

INTERNATIONAL STEEL TWIN TIES

are welcome in Denver as in every progressive city because they provide permanent track at a lower cost than any other type of construction.

Any purchasing agent or way engineer will tell you when wood ties cost less than steel twin ties but they'll not tell you now because Steel Twin Ties are actually cheaper.

We have all the facts and figures to convince you.

The International Steel Tie Co.
Cleveland, Ohio

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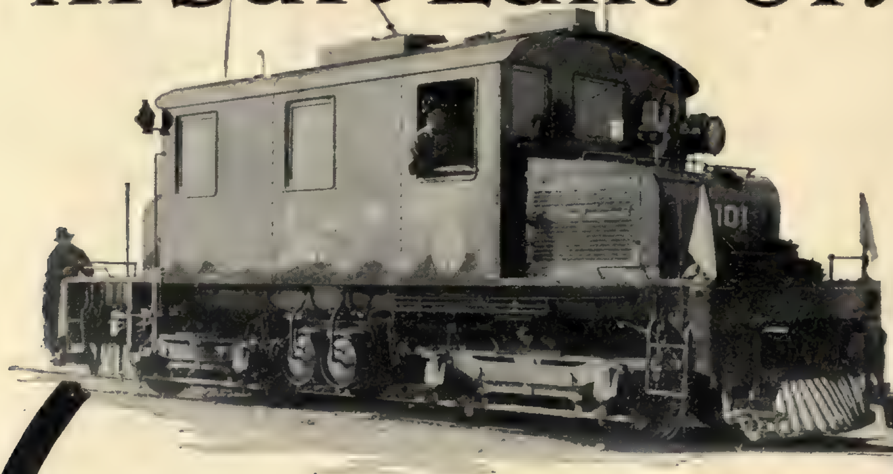
Electric Freight Haulage in Salt Lake City

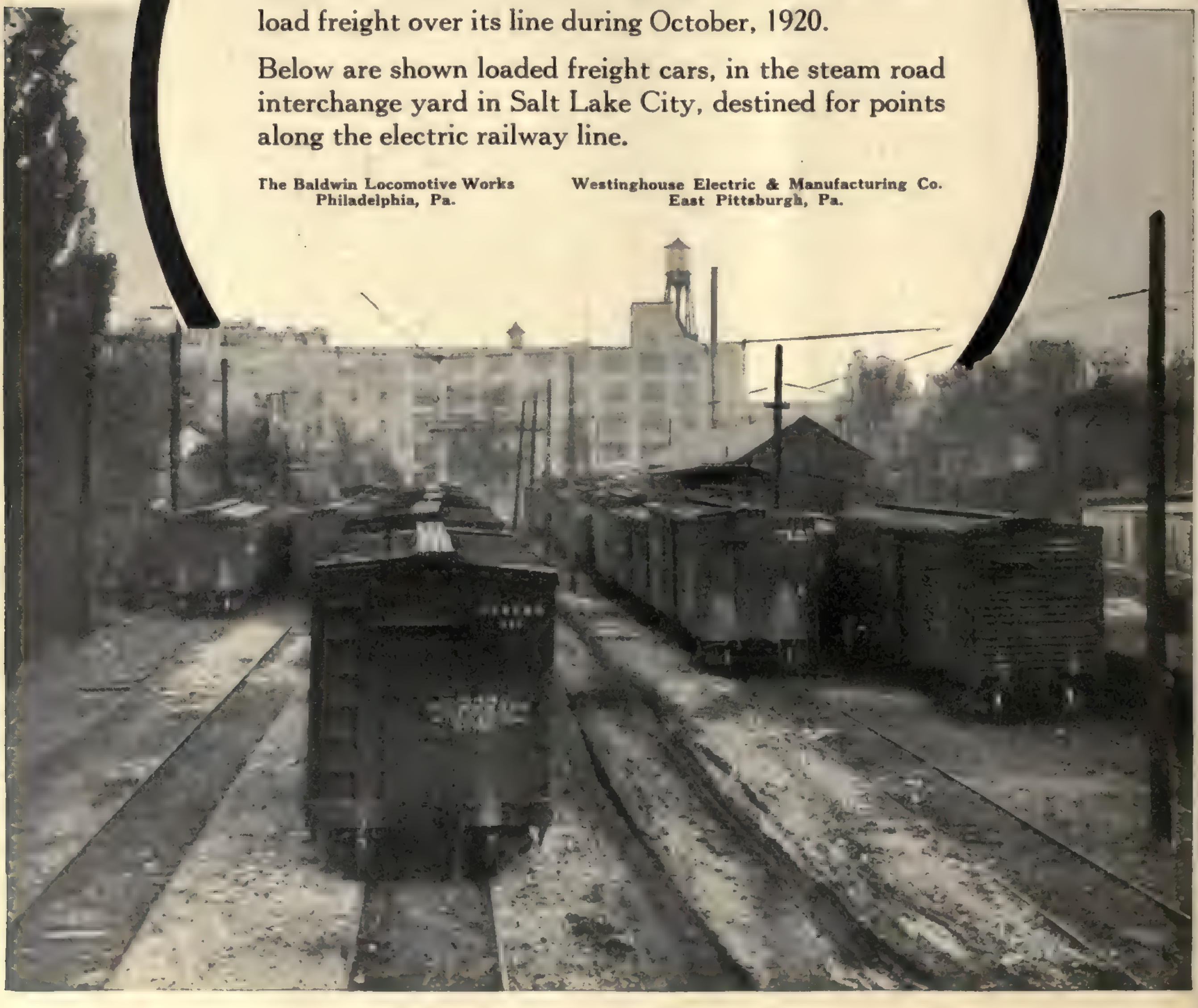


With Five 50-Ton Baldwin-Westinghouse Locomotives, The Salt Lake & Utah R. R. handled 1542 cars of carload freight over its line during October, 1920.

Below are shown loaded freight cars, in the steam road interchange yard in Salt Lake City, destined for points along the electric railway line.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.



Vol. 56, No. 24 New York, December 11, 1920 *Pages 1179-1222*

Electric Railway Journal

HENRY W. BLAKE ~~and HAROLD~~ V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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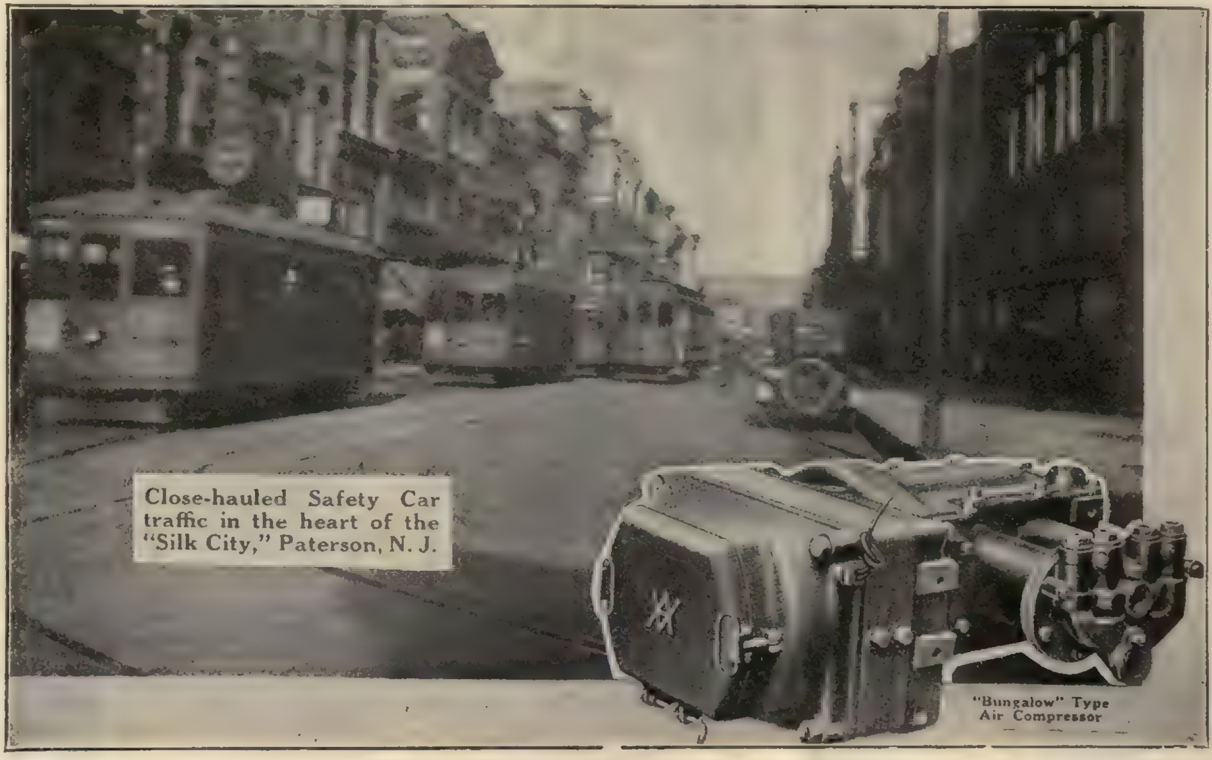


Close-hauled Safety Car traffic in the heart of the "Silk City," Paterson, N. J.

"Bungalow" Type Air Compressor

Excellent Performance Brings Its Reward

"Bungalow" Air Compressors that were selected for the entire number of 200 Safety Cars recently purchased by the Public Service Corporation of New Jersey will serve the State's largest cities, Newark, Plainfield, Paterson, Passaic, Jersey City, Hoboken, Elizabeth and New Brunswick. This is but one of many cases where excellent performance has brought its reward to the "Bungalow." All the largest orders specify "Bungalows"—Brooklyn, 200; and Eastern Massachusetts, 250.

To date 187 electric railways throughout the country have applied "Bungalows" to 3330 Safety Cars.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

TRADE MARK

New York
San Francisco

Washington

Chicago
St. Louis

And now comes Racine. One of forty safties purchased by the Milwaukee Electric Railway & Light Company

Yes, The Safety Devices Combination Surely Does Work

Out of the fifty-five operators who reported to the 1920 Committee on One-Man Car operation, just one had any direct fault to find with the reliability of the emergency feature mechanism—the famous Safety Devices Combination.

Pretty prideful record isn't it, when you consider that the reports covered installations from Florida to Canada and all the climate in between; and the Combination as a whole was entirely new to the users.

With the experience from the operation of 5000 equipments to draw upon today, you may rest assured that you will get the very highest degree of safety attainable provided your specifications bear in mind that

It Is a Genuine Safety Car Only When

it is equipped with automatic laborless apparatus, so interlocked, that regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

Safety Car Devices Company
Boatmen's Bank Bldg., St. Louis
Chicago San Francisco New York Washington Pittsburgh

Phono-Electric

In the Capital of The Emerald Isle

More than one-half of Dublin's mileage of trolley-wire is Phono-Electric. Not only on the main tram thoroughfare—Sackville Street—but on miles and miles of other routes has this super-service wire been installed.

In fact, out of a total of 101 miles of track in the city, some 60 miles are standardized on Phono-Electric: 10 miles of No. 0, 50 miles of No. 00, and 2 miles of No. 000.

Bridgeport Brass Company
Bridgeport Connecticut

2192-B

B
TROLLEY RETRIEVER
U.S. PAT. 9-13-19. 1-15-17
THE OHIO BRASS CO. MANSFIELD, OHIO

A passenger told us about it

For City Service

O-B Catcher keeps the trolley rope reeled in and catches the pole when the wheel leaves the wire.

Exclusive feature prevents "stepping up" of pole.

Same sturdy construction as the O-B Retriever.

A fast interurban was pounding the rails at a merry pace—making up time.

Bang!

The wheel jumped and the trolley pole hit a bracket.

Bang! Bang!

Before the limited could be stopped, the pole was lost completely. The car and its impatient occupants waited until the next car came along, pushed the derelict to a siding and took the transferred riders to their stations.

This unfortunate limited was not equipped with an O-B Retriever.

When the wheel leaves the wire the O-B Retriever stops it and instantly pulls the pole down out of harm's way. O-B Retriever has a simple rugged mechanism and a strong spring. It acts promptly and positively.

A trial on your cars at our expense can be arranged.

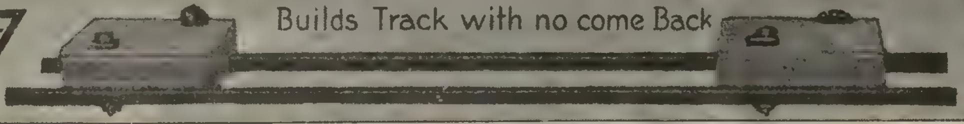
THE OHIO BRASS COMPANY, Mansfield, O.

New York Philadelphia Pittsburgh Chicago
San Francisco Los Angeles Paris, France

Manufactures:—Car Equipment, Trolley Materials, Rail Bonds, High Tension Porcelain Insulators, Third Rail Insulators.

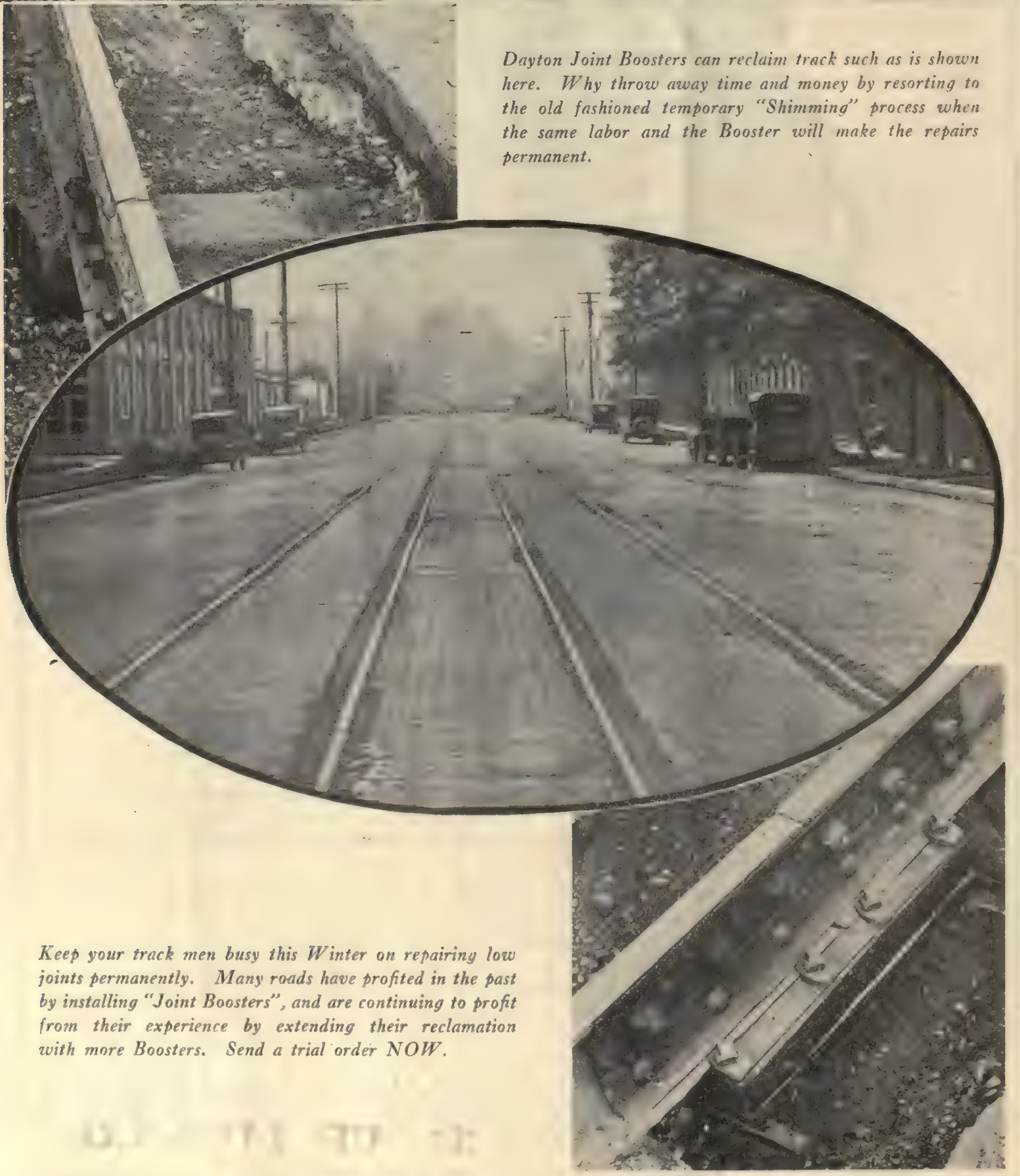
The RESILIENT RAILWAY TIE

Builds Track with no come Back



DMT Co.

DMT Co.

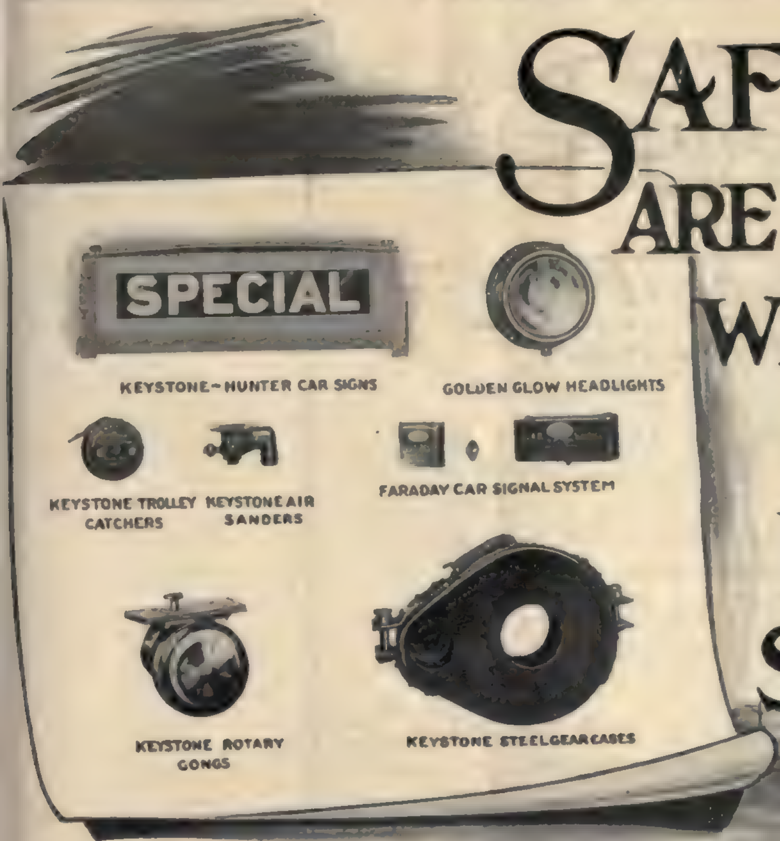


Dayton Joint Boosters can reclaim track such as is shown here. Why throw away time and money by resorting to the old fashioned temporary "Shimming" process when the same labor and the Booster will make the repairs permanent.

Keep your track men busy this Winter on repairing low joints permanently. Many roads have profited in the past by installing "Joint Boosters", and are continuing to profit from their experience by extending their reclamation with more Boosters. Send a trial order NOW.

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

SAFETY CARS ARE MOST EFFICIENT WHEN EQUIPPED ~ WITH ~ KEYSTONE SPECIALTIES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GOLDEN GLOW HEADLIGHTS
KEYSTONE TROLLEY CATCHERS
KEYSTONE AIR SANDERS
FARADAY CAR SIGNAL SYSTEM
KEYSTONE ROTARY GONGS
KEYSTONE STEEL GEAR CASES

Signs, headlights, catchers, sanders, car signal systems, gongs and gear cases —all equipment which is of utmost importance in the building of a safety car.

The fact that these specialties used on the standard Birney Safety Car were chosen from the line of Keystone Car Specialties is a point for you to remember when buying safety cars.

Our Bulletin No. 167 shows many other specialties for use on safety cars—equipment which has been proven good and economical to buy.

Write for complete data

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

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Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

Saving the Waste in Transmission

"Save the Waste," is the slogan in the country's power plants. And if it is essential to save the waste in the *production* of power, it is doubly important to *conserve* this power in transmission.

Copper, because its conductivity is higher than that of any other metal, is the ideal material for transmission lines.

Anaconda trolley wires and transmission lines are made from pure electrolytic copper of average conductivity of 100.75% Mathiessen's Standard. Their use eliminates waste in transmission.

ANACONDA COPPER MINING COMPANY
Rolling Mills Department
Mills—Great Falls, Montana
General Office: 111 *W. Washington St., Chicago*

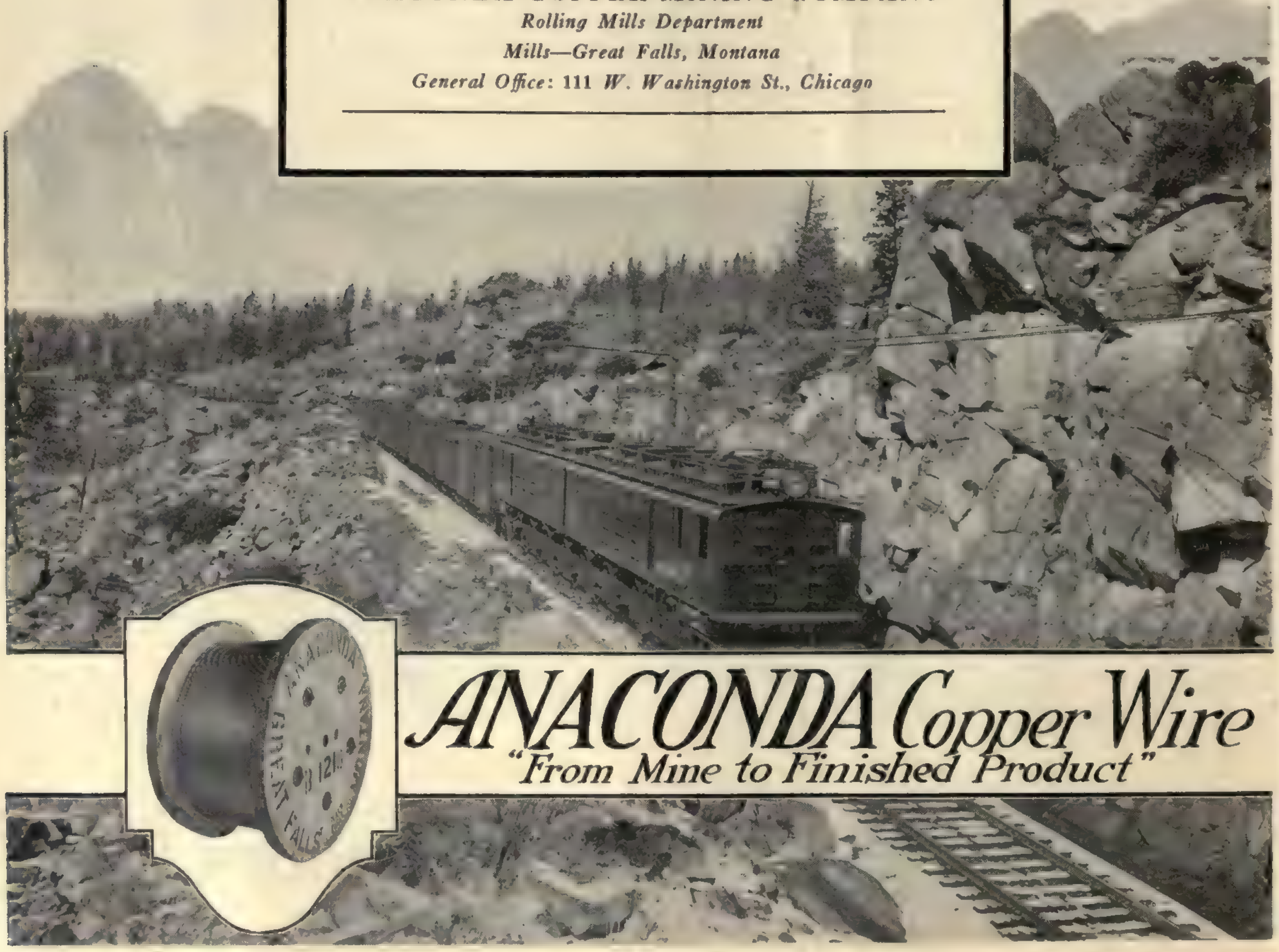
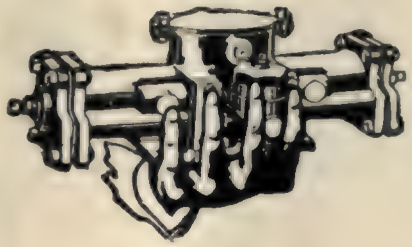


Photo Courtesy C. M. & St. P. Ry.

ANACONDA Copper Wire
"From Mine to Finished Product"



Pneumatize!

For This Winter and After

National Pneumatic Door and Step Control is a money-maker and a money-saver every season of the year—

But think of its exceptional value in winter!

First—In comfort to your passenger because the doors are not open one-tenth second more than necessary.

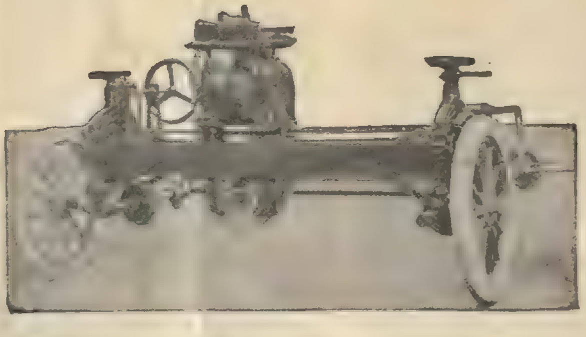
Second—In satisfaction to your men who find the task of hand operation doubly disagreeable in cold and slush.

Third—In profit to yourself through keeping your heating bill *down* and your traffic returns *up*.

Let's help you start
Pneumatizing this winter!

National Pneumatic Company, Inc.
50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

Atlas Rail Grinder



Universal Rotary Track Grinder

For removing surplus metal after welding

Reciprocating Track Grinder

For removing corrugation and grinding new and slightly cupped joints.

Each of these machines has certain definite advantages for certain definite work in producing smooth track. Their use is certain economy.

Let us explain in detail.

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ELECTRICAL ENGINEERING & MANUFACTURING CO.
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7 year old twins

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Almost innumerable installations—made 10 or more years ago—in all parts of the country, prove the permanence of Armco Culverts made from rust-resisting American Ingot Iron.

There is a manufacturer in nearly every state, and in Canada, making genuine rust-resisting **ARMCO CULVERTS** and other products of American Ingot Iron such as flumes, siphons, tanks, road signs, roofing, etc. Write for full information and nearest shipping point on products in which you are interested.

ARMCO IRON CULVERT & FLUME MFRS. ASSN.
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ARMCO CULVERTS

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a tin smelter in England
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a dye plant in Germany
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and so on, hundreds upon hundreds, from every corner of the globe.

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Approximately *eleven thousand copies of McGRAW-HILL publications regularly reach our readers outside of the United States and Canada.

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Is it "human nature" to walk or ride?

Take the average man on the street—waiting to go, say, a distance of a few blocks. Is he inclined to walk or ride? The answer depends largely upon the street car service available.

With cars having a headway of ten or fifteen minutes the chances are ten to one that he'll walk. With frequent car service—a car in sight—the chances are ten to one that he'll *ride.*

In other words, the amount of short haul, profitable patronage is dependent to a great extent on the service given by the operating company.

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The use of Johnson Fare Boxes eliminates delay in fare collection. This means reduced standing time, faster schedules. Seconds saved on stops means minutes saved on runs, and in the course of a day, is often equivalent to one or more additional cars in service.

Considered only from the angle of increasing the number of short ride customers, Johnson Fare Boxes quickly pay for themselves, but in addition to this feature, they actually increase gross revenue as high as 3 to 10%. Hundreds of progressive Electric Railways will verify this. Write to any Johnson Fare Box user for verification and to us for all the facts.

JOHNSON FARE BOX COMPANY
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is woven from specially selected long fibre cotton.

The fabric is treated in our own bleachery by a special process which gives it a smooth uniform finish, increases its insulation value and mechanical strength.

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Irvington Insulation in silk, cotton or paper in punched form, washers, tubing or odd shapes can be supplied to meet your requirements.

Our increased facilities enable us to make prompt shipments of orders.

Samples and data on request.

Six Factors of Quality

High Dielectric Strength

Added protection for the same construction.

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Leakage reduced to minimum.

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The flexible nature of the material increases speed and efficiency of production without reduction of standards.

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Leakage attendant upon atmospheric changes eliminated.

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Not affected by working temperatures.

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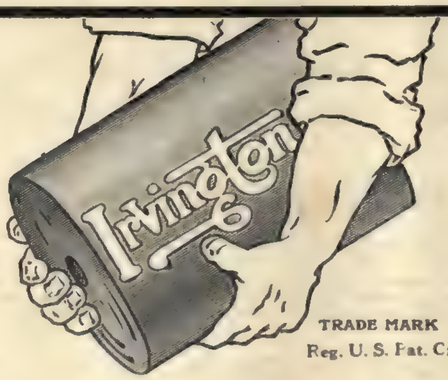

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IRVINGTON VARNISH & INSULATOR Co.
Irvington, New Jersey.
Established 1905

The World's best Lubricants

GALENA -OILS-

"The right oil in the right place"

GALENA SERVICE

For over a quarter century the slogan of our Mechanical Experts—the maxim representing the foundation of *Galena Service.* Lubrication must be considered from two view points: the first is the selection of the lubricants and the second, its proper and continuous application to bearings, in the amount required.

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Galena Oils

stand on performance and not on claim. They need no brief to establish a reputation as "right" oils. In daily use on hundreds of steam and electric railways, they are today—as for many years past—the accepted quality standard for railway lubrication. They prove their worth by giving extra service and standing strains of railway work without a break. There is a tested and reliable Galena product for every class of electric railway work.

Galena Service

has become such an indispensable ally to the operating departments of railroads that it is now represented in every part of the country. It brings the personal help and co-operation of mechanical men—trained specialists in Galena scientific lubrication methods—that assures the correct application of the right lubricants and the elimination of the annoying and expensive troubles due to improper lubrication.

Galena Lubrication Service is working at the top-notch of efficiency. It has gained the unqualified endorsement of representative railway officials—and the sincere flattery of imitation by oil concerns, which, of course, means a general recognition of its worth and ability.

THE GALENA-SIGNAL OIL CO.

NEW YORK FRANKLIN, PA. CHICAGO

Offices in all principal American Cities

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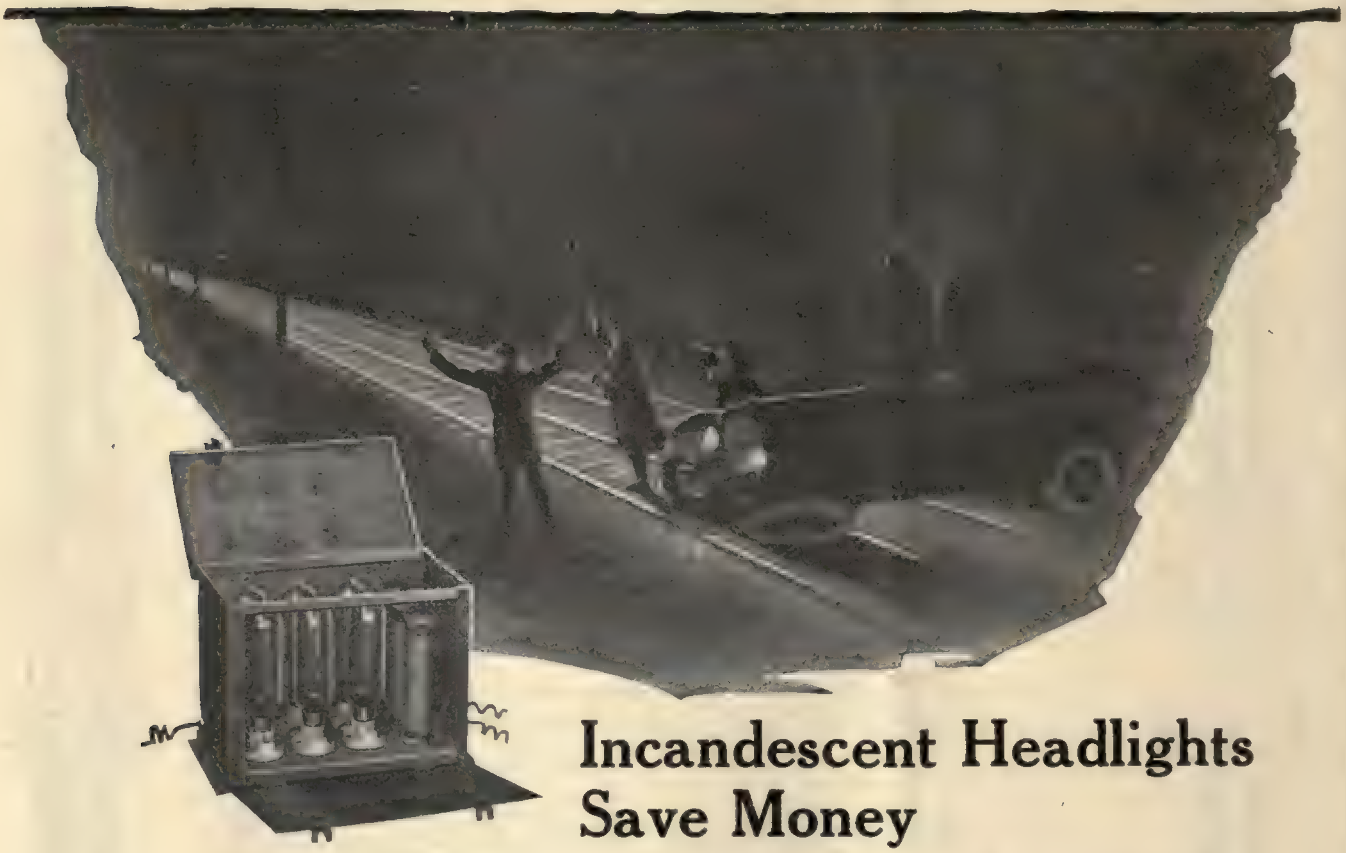
GALENA SERVICE

For an adequate return upon investments electric railways must reduce operating costs to the minimum consistent with safe and efficient operation.



Incandescent Headlights Save Money

The master mechanic of a large railway property stated recently that his incandescent headlights with GECO resistors save his road the wages of at least one man, released for duty elsewhere. This is because incandescent headlights require no expert attention for maintenance or repairs. Despite this fact, they are highly effective when used with GECO resistors which maintain practically constant current regardless of trolley voltage fluctuations. This low maintenance and absolute reliability, the prime requisites of an efficient headlight, are satisfied by this type of equipment.

GECO Lights Are Always Bright

Ask our nearest office for Bulletin 63800 and the expert advice of our railway specialists

General Electric Company

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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C. E. R. A. Hears How to Sell Service

ANOTHER very much worth while meeting of the Central Electric Railway Association is a matter of history. Even without the addresses of two prominent men on the program, who were unable to be present, the meeting at Indianapolis seems to have been adjudged a decided success. Particular interest was manifested in the appeal made by W. L. Goodwin for sales co-operation within the industry and sales managers to sell electric railway service to the public. What seemed to "hit home" was Mr. Goodwin's statement that it is utterly impossible for an executive who is absorbed in all of the technical problems of producing service to be at the same time a successful salesman of his product, transportation.

There has been quite a good deal of talk in the industry the last two years about using merchandising principles in selling electric railway service, but much of this has been of a rather intangible character. It was something that should be done, but how it was to be accomplished was the part largely untold by the speaker and not understood by his auditors. Mr. Goodwin's ideas were more definite, and this fact, together with his demonstration of a sales talk, probably accounts for the unsual interest he aroused. It is apparent that he has a rare gift of salesmanship himself, and, having in mind the great work he has done in promoting co-operation among the several branches of the electrical industry, we hope that he may promptly be induced to apply further his genius along these lines to the electric railway field. He should be heard from again.

Does Courtesy by Railway Employees Pay?

A CHICAGO Surface Lines conductor recently found that it did—at least to the extent of $50 which he was awarded by a daily newspaper in a politeness contest. The experience of the newspaper reporter with this conductor was nothing unusual, but it revealed how an employee may make a favorable impression by the exercise of proper judgment in stretching one of the company's rules. In this instance the conductor accepted a transfer at a non-transfer point, but explained courteously what the passenger should have done and allowed him to ride a short distance to his destination. The company was possibly out one fare by the transaction, but it had gained much more through the courtesy of an employee.

This conductor's policy as explained in an interview quoted by the newspaper is as follows: "I try to treat them right. So many people get confused on this transfer business—there are so many different rules and regulations. But I size the man up. If he looks honest and his intentions seem good I usually give him the benefit of the doubt. Sometimes I have to throw the dead beats off—I can usually tell them from the others."

Nearly every book of rules for trainmen has a sentence reading, in substance, "Use proper judgment in all cases." One difficulty in the selection of employees is to choose those capable of exercising proper judgment. Where the company loses an occasional fare through the stretching of a rule it should gain a hundred-fold through the friends made by courtesy. No company wants to be defrauded by unprincipled passengers, but if the trainmen report all cases of lenient construction of the fare rules by them there is little danger that such an attitude by the company will be abused.

Keeping the Public Fully Advised on Labor Matters

IF A company is sure that its position in a labor controversy is absolutely on the square and thoroughly fair to public, employees and company, it seems to us that the plan adopted by the Virginia Railway & Power Company during its recent labor negotiations can well be taken as a noteworthy example of how to keep the public correctly advised. In Richmond and the other cities served by this company the full text of each proposal made to the men and the corresponding reply from the men were simultaneously published in each of the daily newspapers, the space used being paid for. In other words, all negotiations were made public as they proceeded, and there could thus arise no opportunity for a distortion of the company's intentions or the reasons for its position. It seems to be very generally agreed that a strike wins or fails as it has or does not have public sympathy. This being the case, why should not the companies see to it that the public, the jury, has all the facts all the time in the exact form in which they transpire. The public is the party most seriously inconvenienced by a strike and the one that must stand the bill if wages are increased. Hence, there is every reason why this party should be informed on every move, and the Richmond plan seems to be a good way of doing this.

An Axiom for Public Relations

A GREAT DEAL is said from time to time about how to "get on" with the public and how to get the message across to the public. For some reason or other, it appears the public doesn't understand all that we wish it to understand. People seem to be awful fools because propositions which appear to be so simple are not comprehended at once.

How much of this is our own fault? We heard a slogan the other day, stated by Judge Reed of the Kansas Court of Industrial Relations, which appealed to us as pointing out the reason why much of this has not "got across" and at the same time how we may accomplish what we wish. This slogan is:

"Treat the other fellow according to *his* understanding of your business and not according to *your* understanding of it."

Is the C. E. R. A. Slowing Down?

AT ITS recent meeting the C. E. R. A. adopted half-heartedly an amendment to the by-laws which provide for two meetings a year instead of three. One will be the annual meeting in January and the other the summer meeting, a boat trip usually, which is largely social in character. Without reference to the custom of, or what may be desirable for, any other association, we are inclined to think the Central Association is making a mistake by further reducing the number of meetings. The principal reasons that were assumed to be behind the proposed change, although no one present had any particular enthusiasm for the amendment, were that fewer meetings might be better attended and that the expense to the companies of sending their men would be less.

The members of this association are all within easy reach of any meeting place in the territory, so that the items of expense and time lost in getting to and from a meeting are of small consequence, an entirely different situation than that which surrounds meetings of the American Association. And, as to this expense, one prominent railway member, who like a number of others was not present at the session when the matter was discussed and was very much disappointed when he heard of the action taken, expressed our feeling in a few words when he said: "The money spent in sending men to these conventions is the cheapest money we blow in." Any man who does not bring back information worth many times his expense account is one whose mind is not on his job. Even if there were no formal meeting and no program, the getting together with other railway men who are working on solutions to common problems is sure to be productive of an exchange of experience that is invaluable.

As to better attendance at fewer meetings, we are not at all "sold" on this idea and feel that arguments of as much weight could be made in support of a contention that one or two more meetings would improve attendance. As a matter of fact, the C. E. R. A. meetings were much better attended in the days when there were four a year than now. The reason that there has been less apparent interest the last year is perhaps very largely because of the pressure of many matters at home. And now with only two meetings a year, if an operating man is prevented from attending one of them, he then has only one opportunity a year for this personal contact with his friends in the business. With three meetings, should he be unable to attend one, there would still be two other opportunities to derive the great advantages of the association meetings.

A suggestion was made again at the Indianapolis meeting that opportunity be provided for the equipment, track and electrical men, respectively, to gather in separate meetings at which problems pertinent to their particular work could be freely discussed. We think this is a good idea, and particularly so if there are to be but two main meetings a year. There are many detail technical problems to which these groups can profitably direct their attention, and it seems reasonable to expect that more can be accomplished when all present in a meeting are interested in the subject under consideration. Such group meetings should not interfere, however, with attendance of these men at the general meetings of the association, for it is there that the departmental men learn much of the problems of the companies as a whole and are thereby better fitted to do their part of the whole business of manufacturing transportation, or any subsidiary company-wide project.

One plan of handling these group meetings in the Central Association would be to have the mornings during a two or three day session given over exclusively to the general sessions, leaving the afternoons open for the several group sessions. This end can be accomplished without going to the formality of creating separate subsidiary associations for these respective groups, along the line of the A. E. R. A. organization. It seems to us that the object sought can be accomplished if the executive committee of the Central Association would simply authorize meetings, in the nature of committees of the whole, of these groups of men, appointing a chairman for each group. These chairmen could then appoint sub-committees to take up any special problems, and any matters requiring association approval could be brought up by the chairman in the general session, after approval of definite recommendation by the committee of the whole. Such an organization scheme would be simple, would increase the organization machinery of the association almost not at all, would lead to a greater interchange of detail operating experience, would result in greater accomplishment along engineering lines and, we believe, would meet the end sought by the operating men and manufacturers.

Reach Out to Suburbanite with City Service

IT WAS to be expected that so thought-provoking a paper as that of Henry M. Brinckerhoff's on "Urban and Suburban Passenger Transportation" (see ELECTRIC RAILWAY JOURNAL for Nov. 27) would produce some interesting reactions. Not the least of these is that contained in the contributions from the steam railroad men, who were united in the opinion that their commuter business was being conducted for less than cost. For this reason they expressed their desire to have this business taken over by the rapid transit lines, leaving to the trunk lines more room in their terminals to accommodate their more profitable long-distance passengers. Indeed, one railroad operator went so far as to say that the average cost in the way of fixed charges, etc., per passenger for the use of the New York terminal of his company was so large that in many cases it exceeded the receipts from the commuter for his entire transportation.

This is not a new complaint on the part of the trunk line operator, who, as long as we can remember, has bewailed his commuter travel as unprofitable, largely on account of this terminal charge. Nevertheless, he continues to force the commuter to use the same expensive terminal as the long-distance passenger, although its marble passageways, spacious waiting rooms and beautiful frescoed ceilings are not only not necessary for the commuter but actually he would prefer to be without them. The reason for this is that when a railroad station is built the architect usually contrives to increase the distance which the commuter has to walk between the train platform and the street, although the chief thought of this passenger is how to get most quickly between the train platform and the street. Hence, a system of bookkeeping which charges any considerable proportion of the fixed charges of these marble palaces to the commuter business is erroneous. If trunk line managements doing a commuter business would take a leaf from the experience of the electric roads they would find that there are many better ways of providing for the commuter than to put him on a par as regards terminal facilities with the long-distance passenger.

One of these ways of caring for the commuter is to provide a simple terminal designed primarily to accomplish (1) speedy switching of trains, and (2) saving of time to the passenger in passing through the terminal. The Brooklyn Bridge terminal of the Brooklyn elevated railways is an early though good example of such a structure. It is used now somewhat less than formerly, owing to the construction of new rapid transit routes between New York and Brooklyn, but a few years ago about 100,000 elevated railway passengers a day passed through this station each way. This compares with about 55,000 daily one-way passengers at the Grand Central Station for both the New York Central and New Haven and Hartford roads, and of about 74,000 for all of the city terminals of the Long Island Railroad. Examples of other compact terminal stations without excessive investment may be found at several points on the Boston Elevated Railway, at Hoboken on the Public Service Railway and elsewhere.

Another solution for the problem of the delivery in the city of incoming passengers is to have a distributed rather than a concentrated terminal. This is now followed for all of the Brooklyn traffic that enters Manhattan over the Manhattan and Williamsburg bridges by the Center Street loop, from which passengers can leave the cars at any one of a number of points. Another example of a distributing terminal is the elevated loop in Chicago, used for both interurban and city traffic. Indeed, this plan of a distributing rather than a concentrated terminal was proposed for New York a decade ago when it was suggested that the Lexington Avenue Subway, then under contemplation, should be built large enough to admit standard railroad coaches from without the city limits. While such a plan was not to be recommended on account of the added expense for excavation, it suggests the third way of caring for suburban traffic, to which we have already referred.

This is to extend the service of the rapid transit line out onto the trunk line tracks, thus doing away altogether with any terminal for the commuter. This plan is followed largely in London; in fact, it was followed there even before the electrification of the underground railways. Since the change to electricity of the Metropolitan and District Railways and the construction of the tube lines the practice has been greatly extended. With the further electrification of the trunk lines extending from London a still greater expansion of this practice may be expected.

The construction of a terminal in the Hackensack Meadows for the steam suburban traffic now being taken into Jersey City, Hoboken and Weehawken, as suggested by Mr. Parsons of the Erie, with rapid transit service in from that point, would be in line with the development mentioned above. The service supplied to commuters on the Pennsylvania Railroad by the Hudson & Manhattan Railroad from Manhattan Transfer is another example.

Europe Will Now Push Electrification, Profiting by Our Experience

MANY persons who look forward eagerly to the convenience and facility of electrification of our steam railroads ask why there is so much more interest abroad in the matter than here. A moment's reflection would show them that conditions on the two sides of the Atlantic are not analogous, that the dominating forces acting to make electrification a reality in the two places are quite different. And they are not the same, either, in all European countries. Different as conditions may be, however, here and there, many valuable lessons will be furnished us by the next few years of electrification progress abroad. And as present practice there shows the effects of the past few years' developments here, so we may expect a reciprocal effect upon our own practice a few years hereafter. It therefore behooves us to watch carefully every electrification move made abroad, to analyze the reasons for the economic pressure forcing it and to study the technical principles applied in working out its problems. Americans are not particularly familiar with the situation abroad; they lost interest in it on account of the slump caused by the war. It is now time to gather up the loose ends of information in order that we may intelligently keep our hold of the situation.

Before the war there was much talk in European countries regarding electrification, and not a few far-reaching plans were made. The governments which owned or directly controlled railroad lines were particularly active. They foresaw what actually came to pass during the war, a condition in which the existence of the countries depended upon the facile movement of trains. Fortunately, they were able to muster their fuel resources to meet the emergency, but it was at frightful cost. The resolve was then firmly made to secure comparative independence of coal for transportation as soon as possible and to stretch the meager supplies of fuel to the limit by the exercise of the best obtainable technical skill. This resolve is now being carried out, at least as far as planning is concerned. Government commissions are actively at work; as soon as the money stringency loosens a bit there will be some real action.

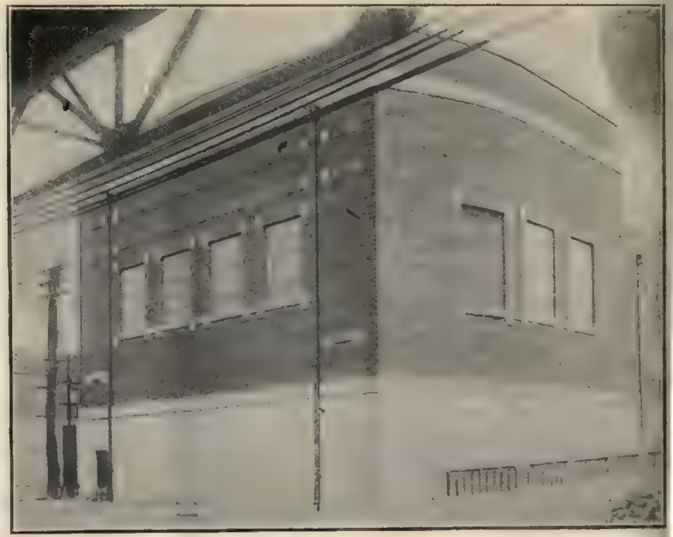
This whole subject was recently presented in a convincing way by Sir Philip Dawson before a group of engineers at Liége, Belgium. His address was abstracted in last week's issue. It shows quite clearly why and how the transportation and power problems of every country are individual. Sir Philip occupies a vantage point for observation of this situation.

Now as to reasons why our neighbors across the water are more stirred up about electrification today than we. Here are some of the salient ones: Enormous cost of fuel, which in some cases must come from outside the country; presence in many countries of water powers, proportionately large with respect to transportation and industrial needs, and to the area over which distribution has to be made; general and vital interest in programs of economy and reconstruction following the waste and devastation of war; need for increasing track capacity by means involving the least capital expenditure. Although the handicaps of expensive capital, disadvantageous exchange rates, shortage of supplies and multitudinous demands upon money, men and materials render the carrying out of an electrification program a Herculean task, this task will be accomplished if we are to judge by what has already taken place since November, 1918.

Electrical Layout in New Substation

Kansas City Railways Has Incorporated Several Unusual Features of Building Design and Equipment in Recently Completed Station—But One Oil Switch Used for Each Pair of Incoming and Outgoing High-Tension Lines

BY S. H. GRAUTEN
Electrical Engineer Kansas City (Mo.) Railways



FIGS. 1, 2 AND 3—FRONT, REAR AND SIDE VIEWS OF NEW SUBSTATION OF KANSAS CITY RAILWAYS

A NEW substation recently placed in operation by the Kansas City Railways is of particular interest because of the peculiar building design, forced by topographical conditions, and the unique layout of the high-tension circuits, resulting not only in the saving of equipment but in improving operating conditions at other substations subsidiary to this one.

In general this new substation was built to supplant the old Kaw River power house and it thus forms a switching center for the entire west side of the city, feeding two other more remote substations and a heavy interurban line. It is also a tie-in point with the Kansas City Power & Light Company's system. Because of the importance of the station as a high-tension switching center it was deemed advisable to build it as a manually operated station, despite the fact that the company now has four automatic substations in operation. However, provisions were made for the installation of automatic devices at a later date, when the separation of the railway and lighting systems will have been completed, thus simplifying the operation of the station.

The new substation is located in the west bottoms industrial district at an intersection of the elevated line and two surface lines. The station is known as the James and Central substation, from the adjacent streets. The location of the station in the bottoms had a very important bearing upon the design of the building. This district was inundated in 1903 and by previous floods, and even though flood preventive measures have been taken along the Kaw River since that time this past history had to be given serious consideration. Consequently the level of the main operating floor was placed at an elevation slightly above the 1903 high-water level and the station laid out so that no equipment which could be damaged by water would be installed below this line.

This high elevation of the main floor gave considerable basement space, part o which was utilized for the oil-insulated transformers, so installed that the bushings are above the high water line, and part by having th machine entrance at the sidewalk level. An openin was left in the main floor over this machine entrance forming an entrance well which permits the truckin of heavy parts directly into the building under th craneway. This entrance well also provides a convenient station for tower truck or emergency wagor a desirable arrangement from an operating standpoint

Some complication was encountered in providing suitable foundations for the building, inasmuch as the so in the bottoms is principally of quicksand, with roc only at great depth. The building was therefore se on a reinforced concrete mat ranging in thickness fro 16 in. to 42 in. The entire structure up to the firs floor level, including machine foundations, was built o solid concrete. Above the floor line the building is c brown matt brick with native Missouri Carthage ston for base course, sills, name panel, cornices and copin The effect is dignified and in keeping with the purpos of the building as well as its surroundings.

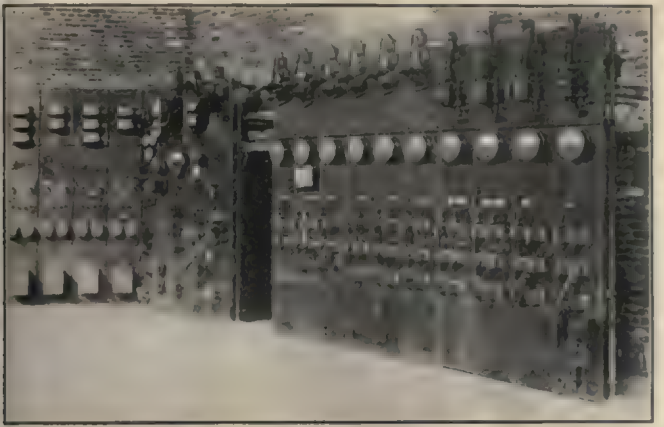


FIG. 4—A CLOSE-UP OF THE SWITCHBOARD, SHOWING THE FOUR HIGH-TENSION PANELS SET ON AN ANGLE TO THE REMAINDER OF THE BOARD

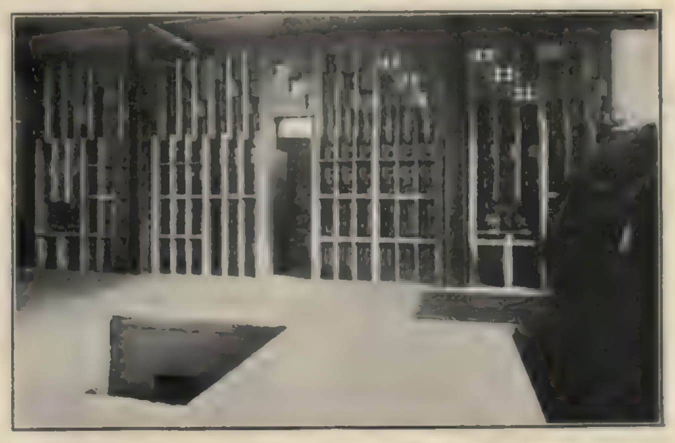


FIG. 5—FRONT OF HIGH-TENSION BUS STRUCTURE. THIS VIEW BEING TAKEN BEFORE INSTALLATION OF THE THREE-COMPARTMENT-WIDE DOORS

The substation was laid out to accommodate three machines of any size up to 3,000 kw., the initial installation consisting of one 2,000-kw. rotary converter. The floor plan and general location of equipment are shown in an accompanying drawing.

ARRANGEMENT OF ELECTRICAL EQUIPMENT

One of the most interesting features of the station is the arrangement of the high-tension lines and their connection to the station bus in a manner which reduces the number of oil switches required to one-half that usually employed for such installations of incoming and outgoing high-tension lines. Four incoming and four outgoing lines are grouped in pairs and considered a unit, each pair being in effect a through line with a tap-off to the bus of this substation. This arrangement requires but one oil switch for two lines, which is obviously a saving of one oil switch together with the accompanying bus structure and corresponding floor space. Each incoming line is provided with reverse power relays and current transformers. Each outgoing line is provided with induction type overload relays and current transformers. The combination has the advantage that it permits operation of any line as a radial line direct from the generating station to the remote substation, independent of the bus at this substation. Economy of cable capacity dictated that the several lines be ordinarily operated in parallel on this

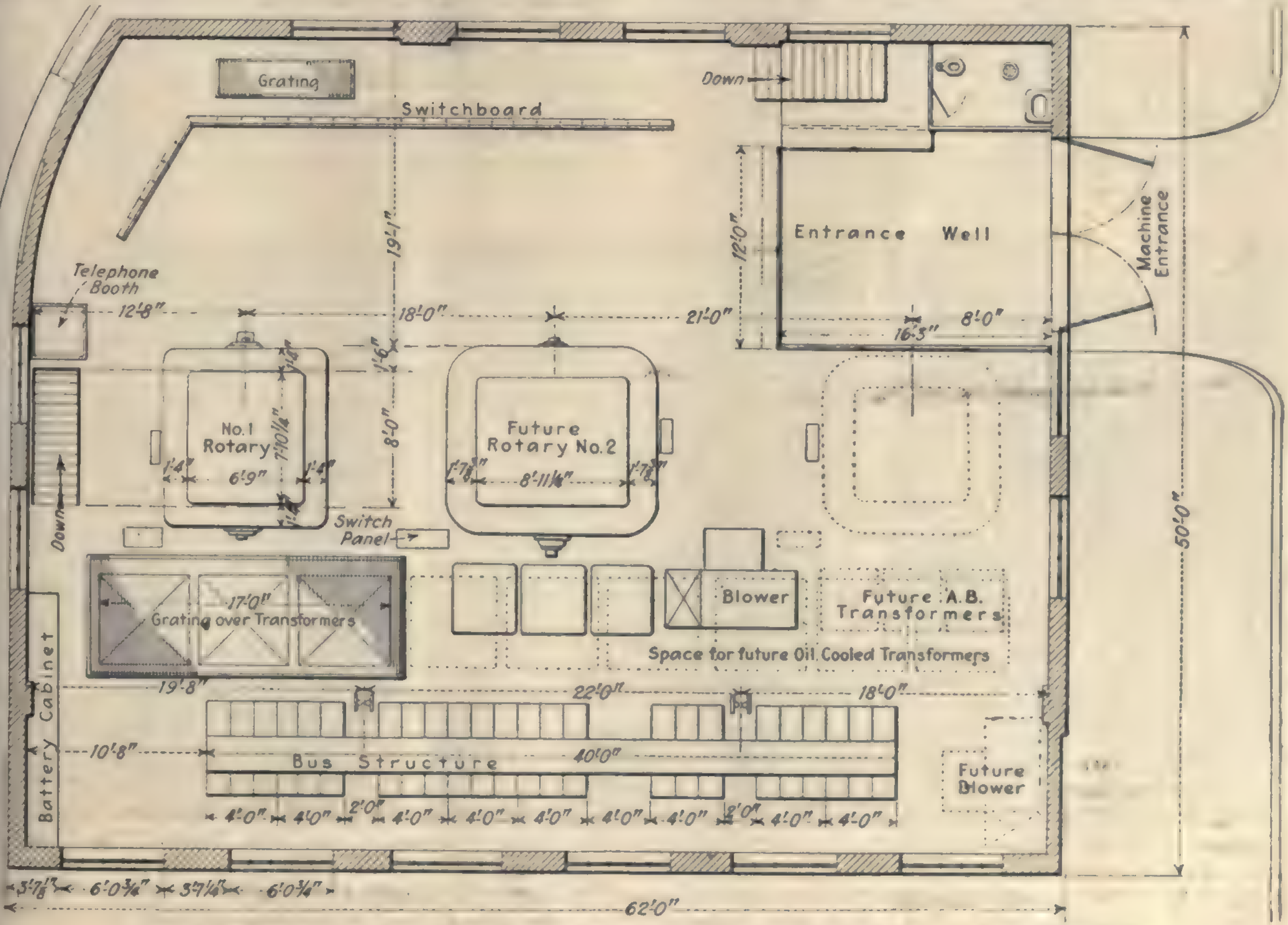


FIG. 6—FLOOR PLAN AND LAYOUT OF EQUIPMENT IN NEW KANSAS CITY SUBSTATION

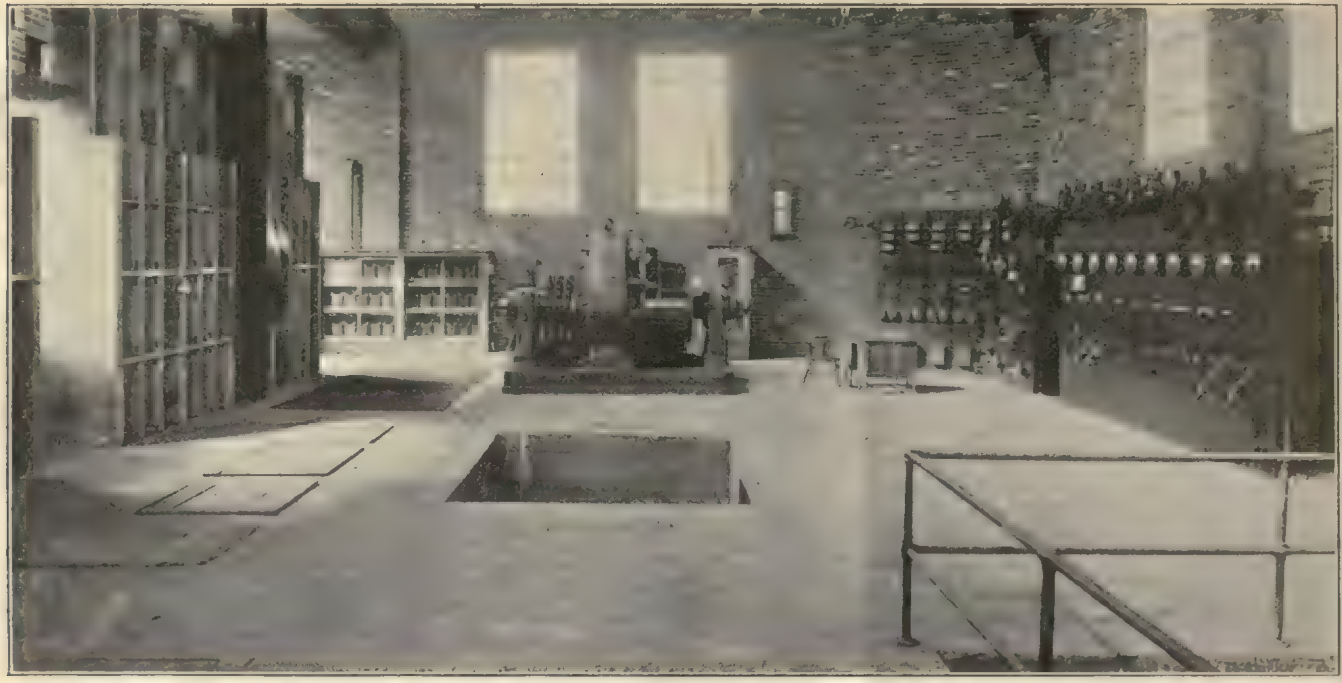
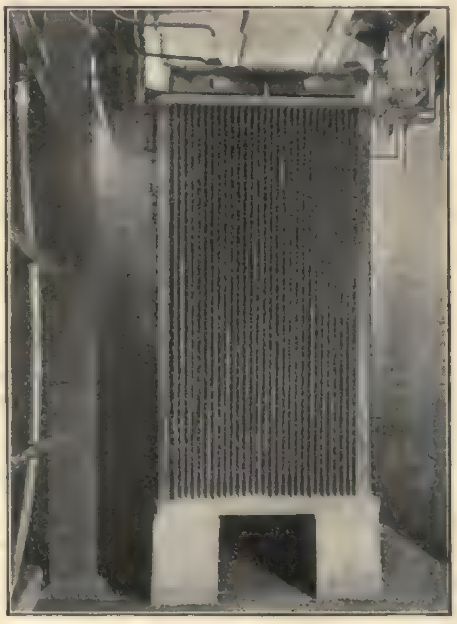


FIG. 7—THE GENERAL LOCATION OF SWITCHBOARD, CONVERTERS, STORAGE BATTERY AND HIGH-TENSION BUS AND SWITCH STRUCTURES CAN BE SEEN IN THIS PICTURE

substation bus, with the outlying substations feeding from this point in tandem fashion. The arrangement of relays is such that when operating in this manner, should there be trouble in this substation, the line oil switches to the bus would open, thus cutting off this station but leaving the cables connected direct to the more remote substations and probably avoiding an interruption of service to these other loads. The number of spare cables required is considerably reduced and with the diversity obtained by the combination of the three substations and interurban load the saving in cable capacity is not less than one full cable. A study of the accompanying circuit diagrams will make this arrangement more clearly understood.

The high-tension bus structure and the oil switches and disconnects are located on the main floor, which places them in a convenient place for operating. There are three sections of the bus, one of which is for future use. Each bus section provides for one rotary converter, two incoming 6,600-volt lines, two outgoing 6,600-volt lines, one electrolytic lightning arrester and one set of potential transformers. The structure is of composite construction, the oil switch valves and main barriers being of concrete, while the barriers between phases are of transite. The bus compartments themselves are made of gray pressed brick with precast concrete horizontal slabs. The transite doors are unframed and are arranged so that one door covers all three dis-



VIEWS SHOWING DETAIL CONSTRUCTION IN KANSAS CITY SUBSTATION

Fig. 8—The machine entrance and well at the front end of the building.

Fig. 9—The single-phase oil-insulated transformers are located in the basement, with the bushings placed well above the high-water line.

Fig. 10—Rear of the high-tension bus structure.

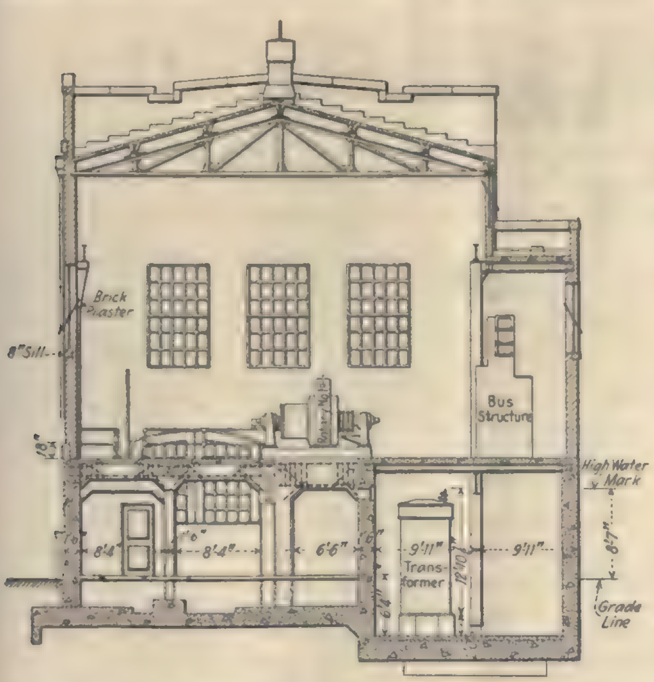


FIG. 11—A LATERAL CROSS-SECTION THROUGH NEW KANSAS CITY SUBSTATION

connects of a given set, so that the removal of the proper door uncovers the three switches which the operator is to handle without exposing other live parts.

The oil switches used are the General Electric Form K-52, 400-amp., 1,500-volt, solenoid-operated remote control. They are operated by a fifty-six-cell Exide storage battery mounted in a cabinet having sliding glass doors. The inside of the cabinet is protected from the acid fumes with acid-proof paint and the cabinet itself is ventilated by a duct through the wall of the building.

The initial converter installation is of standard Westinghouse design. The transformers are single phase, oil-insulated, self-cooled type, and are located in a large room in the basement, over which there is a grating in the main floor.

SWITCHBOARD CONSTRUCTION AND ARRANGEMENT

The switchboard is made up of seventeen three-section panels of marine black slate, manufactured, with the exception of the panels for No. 1 converter, by the General Electric Company. The line of the high-tension panels is placed at an angle of about 60 deg. to the line of the other panels, since this position helps in distinguishing these panels and also makes the instruments more easily read from the middle of the main switchboard. Each high-tension panel provides for an incoming and outgoing line, a reverse power relay being mounted on the bottom section of the board and the overload relay on the lower part of the middle section.

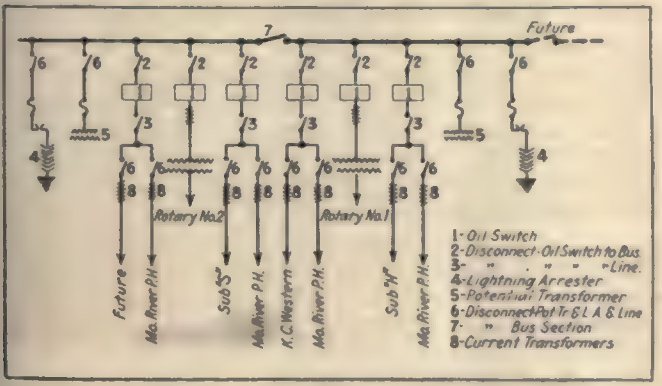


FIG. 12—A SINGLE LINE DIAGRAM OF HIGH-TENSION CONNECTIONS, SHOWING MANNER OF PAIRING INCOMING AND OUTGOING HIGH-TENSION LINES

One ammeter is provided for each incoming line and one for each outgoing line, three plug jacks being provided so that the ammeter can be cut in on any phase, and also for convenient calibration of meters and relays. One voltmeter is provided for each bus section.

A battery panel is provided for the oil switch battery and control of the motor generator set for charging the battery. The feeder panels are each arranged for two feeders of 1,000 amp. capacity each.

MAIN BUS IS IN TWO SECTIONS

There are two main buses, which may be connected together by a tie panel. For convenience of operation, the connection of feeders to these two buses has been so arranged that all feeders to the west are on one bus and all extending to the east are on the other, this arrangement being of considerable value during emergency operation. An auxiliary bus and panel is also provided so that any feeder may be thrown on the auxiliary bus while repairs or inspection are being made on the circuit breaker. On each positive bus section there are two tie feeders and two independent feeders. The independent feeders are equipped with automatic reclosing circuit breakers. The tie feeders, which connect through a section of another substation, are equipped with the usual automatic circuit breakers. The use of the reclosing circuit breakers permits the station to be without an attendant during the off-peak hours, when the number of cars in operation permits a reduction in the rotary converter capacity on the line. All feeders are taken out of the substation underground, either to a pole serving the surface lines or an elevated column for the elevated lines.

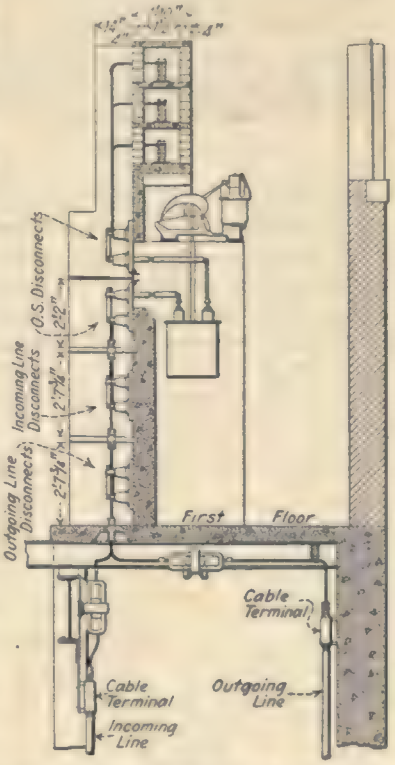


FIG. 13—CROSS-SECTION OF HIGH-TENSION BUS STRUCTURE, SHOWING ARRANGEMENT AND CONNECTION OF OIL SWITCHES AND DISCONNECTS

From the standpoint of negative returns, the substation is very fortunately located, for the number of surface and elevated lines radiating from this point provide an excellent return circuit. These tracks, together with the guard rails on the elevated structure, which are bonded, make a total of twenty-eight bonded rails, averaging 90 lb., radiating from the location of this substation.

Norfolk's Traction Situation—II

Determination of Value Made by a Judicial Decision Based Upon the Consideration of Several Indices of Value Such as Reproduction Cost at Both Present and Pre-War Prices, Historical Investment and Past Deficiency in Earnings

THE valuation of the railway property is an interesting part of the Taylor-Cooke report on the Norfolk traction situation, a review of which was started in last week's issue. Franchise recommendations formed the subject of the first installment; a third part will give the operating analysis and recommendations for rerouting and other service improvements.

Fixation of value for rate-making purposes as one of the guides toward an equitable result with respect to the over-all program was predicated on doing practical justice to the riding public, local property owners and to investors in the property as well as in the securities of the railway company. Valuation is admitted to be a matter of judgment, which in the Norfolk case was guided largely by four partial or incomplete measures provided by historical costs, estimated deficiencies in past earnings and by reproduction costs at 1914 and 1920 prices.

Stone & Webster had previously been employed by the Virginia Railway & Power Company to make a valuation of the property and had reported figures for reproduction costs at 1914 price levels and at 1920 price levels and had also reported on the historical investment. The figures thus reported were checked and accepted with modifications in the Taylor & Cooke report. The following table shows the original Stone & Webster figures and the modifications made:

SUMMARY OF REPRODUCTION COSTS AT 1914 AND AT 1920 PRICES

	Stone & Webster Inventory and Appraisal		Taylor & Cooke Modification	
	1920	1914	1920	1914
Land	$1,149,549	$919,639	$730,049	$584,039
Construction and equipment	9,116,732	4,651,500	9,116,732	4,651,500
Organization prior to construction	853,849	439,968	582,017	317,515
Working capital	223,269	97,960	223,269	97,960
Total	11,343,399	6,109,067	10,652,067	5,65,1014
Portion of power plant chargeable to railway on basis of 16 per cent use	472,000	259,604	472,000	259,604
Grand total (*A*)	11,815,399	6,368,671	11,124,067	5,910,618
Estimated omission (Note *A*) inventory being incomplete	....	....	175,000	100,000

(*A*) Excludes portion of transmission line between Norfolk and Richmond.

The historical investment as developed by Stone & Webster was accepted without modification by Taylor & Cooke. In the determination of the final value to be recommended as a consideration for the base rate the following factors were then set up in a table:

ESSENTIAL FACTORS IN RATE BASE DETERMINATION

	Taylor & Cooke	Stone & Webster
1. Cost to reproduce at 1920 prices	$11,124,067	$11,815,399
2. Cost to reproduce at 1914 prices	5,910,618	6,368,671
3. Historical investment excluding going concern and the increment of land value	7,077,400 (accepted)	7,077,400
4. Past deficiency in earnings below an 8 per cent return (*a*) excess power earnings not deducted	9,016,000	....
(*b*) Excess power earnings deducted	5,118,000	....
5. Minimum going concern value in case of company rendering good service is considered by Mr. Taylor to be	15 per cent of item 3	
6. Present going concern value considered to be	250,000	....
7. Three-year construction program recommended	1,269,395	....
8. Portion of Item 7 required 1920-1921	854,713	....
Note:—Portion on order or under contract	551,831	....
9. Deferred maintenance	830,572	....
10. True deficit, year to April 30, 1920, after allowing adequate reserves for renewals, not including amortization of item 9	157,839	....

With these various "indices of value" thus set up a judicial determination of value was made, the figure arrived at being $8,750,000.*

The arguments in support of a determination of the value for rate purposes in such a manner are then set forth in detail in the report and an abstract of them is here given.

HISTORICAL INVESTMENTS AND EARNINGS

Great emphasis is laid upon the equity and necessity of recognizing unavoidable deficiencies in past earnings as an element of value to be incorporated in the rate base where the existence of such deficiency can be established. This is regarded as a practical measure operating to assure capital in public service that there will be no denial of the right to earn in excess of the usual 8 per cent as and when profitable years occur following the lean period of development in which the property either produces unreasonably low returns or none at all. The considerations of equity which justify recognition of this principle are clearly set forth in the report.

Major causes responsible for past deficiencies in earning power of the Norfolk property were specified as follows:

1. Construction of unnecessary and competitive lines by earlier independent companies under franchises unwisely granted by the city and the necessary inheritance of operating and of fixed charges thereon by the present company and public.
2. Unjustifiable neglect of the company's property and inefficiency of its management during the early years of its operation.
3. Burdensome franchise conditions imposing heavy annual charges upon the company for purposes which are in no sense connected with the function of the street railway.

To such extent that losses of return on the historical investment have been the fault of the companies then or now on the premises they cannot be admitted as part of the legitimate historical cost of the property or considered as an element of value in determining the rate base.

To the extent that such losses have been due to compliance with franchise provisions imposed by the city and to the unavoidable inheritance of fixed and operating charges originating in the construction of unnecessary and competitive transit lines they must be regarded as investment and considered as a legitimate element of value.

While the report attaches major importance to total historical investment plus suitable additions for intangibles as a principal index of the rate base value, the development of historical figures necessarily based on the incomplete records of fifty-one underlying companies, requiring in many cases the subdividing of property and income accounts as between the railway and power business of such companies, did not produce figures representative of investment and deficiency in earning power of sufficient accuracy and reliability as to provide an acceptable and defensible rate base.

Under the heading "Cost to Reproduce as a Basis of Value" the report analyzes the strong and weak points of this theoretical measure and develops its limitation as a practical guide toward an equitable result. The dangers and fallacies lurking in the advocacy of "Present Day Reproduction Costs" as value for rate making are fully presented from the standpoint of public service companies. The following quotations and comments embody the argument on this topic:

---

*This value was questioned by the company before the Norfolk Public Utilities Commission and the $11,000,000 figure argued for, as reported in the JOURNAL for Oct. 2, page 688.

> Even if it be admitted that theoretically the present day "reproduction costs" may reflect, from the standpoint of abstract economic equity, a fair present value for present rate making, it should, of course, be considered only as in the nature of an index and not as the actual numerical basis for computing the "return" to which the capital value of the property is entitled. To do so would evidently be to disregard the apparent fact that we are now on or near the peak of "values" as expressed in dollars and cents and that this peak is not likely to be of sustained duration to the extent that it would be either equitable, wise or economically sound to elevate service rates to a peak equivalent to this unstable "value" peak.

In other words, the interest of public utilities is to establish the "return" to which they are entitled upon a stable and defensible foundation, and not to have it based upon unstable peak conditions, the recession of which to lower levels would immediately lay the service company's rates open to attack. While it is stated that the "return" under present day conditions should be greater than in pre-war times in order to recognize specified economic factors bearing upon supply of and demand for capital, it is not believed sound policy to fix the return on a maximum peak basis, particularly as, in order to support the contention, resort must be had to an argument that cuts both ways. On this point the report says:

> It may also be pointed out here that if reproduction costs were to be adhered to in determining the numerical rate base, then in future valuations and adjustments of service rates, which might be made in a period of low reproduction cost of a property built in a high cost period, the result would be an unwarranted reduction of rates and confiscation of property investment equivalent to such reduction. Conversely, if patrons of a property built in low cost periods were charged rates based on abnormally high and presumably non-permanent reproduction costs, such as at present existing, such rates could not be otherwise than excessive and beyond the reasonable worth of the service sold.

The inherent inability of cost figures developed under the reproduction theory to represent and interpret "value" in the broad sense which must be considered if valuations are to be used as a measure of the reasonableness of rates is summed up as follows:

> One of the important factors to be regarded in establishing such a value centers about the ability of the property to give the service to which the community is entitled. Determination of costs upon the "reproduction" theory must necessarily be based upon the property as it exists, at the same time realizing that if the service facilities were to be reproduced today the property providing them would be of substantially different character than that which is actually in use.

Following development of factors centering about the value question, as outlined in the foregoing, a conclusion is reached that:

> Consideration of such factors further emphasizes the truth that reproduction cost figures are of weight only for judicial and judicious use as a guide toward fixation of value of a proper and fair order of magnitude.

BOND DISCOUNT TO BE AMORTIZED

The company is conceded the right to amortize bond discount out of earnings as part of the cost of operation in order to provide for refinancing security issues upon maturity. If earnings are insufficient to provide for discount reserves the amount of shortage which a company would have to pay out of its treasury upon maturity of the bonds is considered as part of the cost of developing the business and should be included in the rate base until it can be amortized and withdrawn from permanent capitalization.

Going concern value is "essentially the difference between the 'cost value' of inert property and the value of that property enlivened to service through application of human energies." It is recognized to be present in the Norfolk railways to a much less extent than in others which have maintained service of a character which begets maximum patronage with corresponding profits. In the absence of special conditions entitling it to more it is considered that 15 per cent of the established rate base represents a minimum allowance for going concern value for a property furnishing good service. While in view of local service conditions in Norfolk only nominal allowance is made for this item it is recommended that it be included in the company rate base in full amount following required improvement in service.

"SERVICE" DEPRECIATION ALONE CONSIDERED

The point of view taken with respect to depreciation as a factor in rate making is an interesting chapter of the "value" section of this report. It states in the preamble:

> For the practical purpose with which we are herein concerned, physical property in public service may be considered as subject to two broad classes of so-called depreciation:
>
> 1. That theoretical depreciation which sets in and accumulates between the condition now of a physical item and the condition at which its practical serviceability begins to become impaired, and is replaced as a matter of maintenance.
>
> 2. That real deterioration in service value which begins to occur at the limit of good service life, accumulating rapidly thereafter through stages of poor service and bad service life to a point where the physical item ceases to function as an element of property useful in the public service.

Theoretical depreciation is discarded as an academic factor and in view of the truth that the theoretical computations on which it must be based can be put to no practical use. The doctrine tending to support it as an element of weight is believed to be faulty on economic reasoning, but aside from that question the theory itself, it is stated, cannot be correctly incorporated in its numberless refinements in any practical system of accounting yet devised. As to its effect on the broad question of "value" the report says:

> Any real conception of the sweep of economic tides and of the forces making for obsolescence which underlie the "value" question shows clearly that these transcend in effect and importance all such petty correction factors as would result from an attempt to work out practically such a theory of depreciation to a logical conclusion.
>
> As such depreciation is a theoretical liability which never matures so long as the property continues to function, a street railway company should not be required, from the public viewpoint, to accumulate out of earnings and maintain a fund equivalent to it which burdens the company with an additional needless expense to no useful purpose.

Deterioration below good service condition as a kind of depreciation, being a matter of vital concern to both public and company, was made the subject of extensive field surveys to determine the practical physical things which have to be done in Norfolk to provide the basis for satisfactory and efficient service. The rehabilitation program thus developed shows, by street locations, necessary repairs and resurfacing of track, necessary relocations of track and portions which require complete rebuilding, together with the cost of this work and of necessary rehabilitation of passenger cars. Total cost of restoration to be effected through the specified program aggregates $830,572.

GOING CONCERN VALUE PRESENT ONLY AS JUSTIFIED

While it is stated as a basic proposition that fares should be made sufficient to establish adequate reserves to provide for renewal of property not taken care of by current maintenance it is, on the other hand, considered that in the Norfolk case it would be unjust in principle to concentrate the above cost of correcting deferred maintenance on the present riding public through a fare increase for that purpose. Referring further to this subject the report says:

> It is also necessary to give great weight to the cause of deterioration, *i.e.*, whether it has been allowed to accumulate as a result of unjustifiable inefficiency of management and as a result of diverting earnings to pay unjustified dividends at the expense of proper upkeep of property, or whether past earnings have been insufficient to permit of adequate current maintenance and setting aside of proper renewal reserves to take up the invisible accumulation of physical wear and obsolescence when these have matured at the limit of good service life. It is also essential to consider the effect of inescapable physical conditions inherently affecting operation of the property, in their tendency to shorten the life thereof and to exact heavy expenditures for its proper upkeep. Such conditions exist in the Norfolk situation in the character of the subsoil and drainage underlying track foundations. These are such as to prevent the maintenance of good track surfacing except at the cost of constant abnormal expenditures for this purpose.
>
> Earnings have been insufficient to provide for the abnormal amounts which company should have spent on such work, resulting in poor surface of track and bad joints characteristic of the past, and of today, in the streets of Norfolk and on county lines.

For the above and other reasons set forth deterioration below good service condition as measured by cost of restoration was not considered as a deduction in arriving at the rate base value. The position was taken that cost of restoration simply represented an element of value now absent from the property but which must be promptly incorporated and maintained therein out of company resources amplified and strengthened through means specified in the comprehensive program, and not out of proceeds from a fare increment designed for that special purpose.

AMOUNT OF VALUE ESTABLISHED

After consideration of all factors conceived to bear upon value for rate making of the property and going business organization producing street railway service covered by the report the rate base was established at $8,750,000 as of Jan. 1, 1920. Upon this the company should be entitled to earn a return of 8 per cent, and upon subsequent investment it should be entitled to a return at a rate commensurate with interest cost of new capital plus a just profit thereon. The above valuation is at a rate of approximately $89,000 per mile of equivalent single track operated and is about midway between reproduction costs at 1914 and 1920 prices, and about $1,700,000 in excess of estimated total historical investments in physical property. Provision is made, presumably as an expedient to get practical results, that when the company completes the new construction and rehabilitation program and is rendering the service so provided for it shall be entitled to add 15 per cent to its rate base for minimum going concern value, instead of the nominal amount of $250,000 which was temporarily allowed.

Snow Costs Money

Snowfighting Is a Serious Problem for Most Electric Railways, but a Well-Organized Force with the Proper Equipment Will Solve It

WHEN snow is not removed from city streets and main trunk highways the public pays the bill. New York's vehicular paralysis during twelve days of February, 1920, meant an economic business loss of $60,000,000. Figuring conservatively, the nation's business loss due to the snow invasion of last winter was at least $500,000,000, states the *Commercial Vehicle*, New York, a motor truck fleet owners' magazine.

The seriousness of the snow removal problem is perhaps greater this year than ever before. What are we going to do about it? The first requisite is a public realization of the problem, and that snow can be removed and money saved by removing it. True, snow is one of Nature's greatest problems which man must solve. But its solution is not an impossibility if we first admit that snow is a problem and then attack that problem in a businesslike way.

Snow removal is essentially an emergency work. The snow battle consists of three main phases, the attack, the battle and the clean-up. The campaign must be worked out months in advance. Plans cannot be made the day the storm arrives. Then it will be too late. More snow battles have been lost on account of a delay in the attack due to a lack of a prearranged plan than for any other cause with the exception of inadequate apparatus with which to make the fight. There must be a plan worked out months in advance.

Additional labor and private vehicles and other equipment must be employed during the emergency. Labor must be paid at a rate in excess of the average in order for the city to compete with industries.

Owners of trucks suitable for snow removal work must be paid in excess of the rate which can be obtained from ordinary industries in order that contracts can be made for such equipment in advance and such contracts kept. Heretofore such contracts have been broken because the vehicle owner could make twice as much money hauling for private interests after a storm as he could in helping to remove the snow.

It also seems necessary that the vehicle drivers should be paid a bonus over and above their wages as paid by the vehicle owners in order that they can be called and actually put into service immediately the snow has reached a certain depth, be it 4 o'clock in the afternoon or 4 o'clock in the morning. Greater progress can be made in removing or plowing the snow in two hours after it has started falling than can be made in ten hours after it has become packed by vehicular traffic.

Machines instead of manual labor should be employed to the greatest possible extent. The hand shoveler should be eliminated wherever practicable. Motorized plows, mechanical loaders, steam shovels and other forms of contractors' equipment usually idle during the winter months should be employed to greatest possible extent.

In a report received from the American Embassy in Argentina by the Bureau of Foreign and Domestic Commerce of the United States, the statement is made that the Argentine Minister of Public Works is investigating the possibilities of electrifying the Central Norte Argentino Railway from Cordoba to Cruz del Eje, a distance of 93 miles.

Selling and Safety Occupy C. E. R. A.

W. L. Goodwin Arouses Great Interest by Address on the Need for Sales Managers and Co-operation—Bernard J. Mullaney Urges Policy of Publicity — Safety Is Discussed — Association Votes to Have but Two Meetings a Year, Though Discussion Points to Desire for Separate Group Meetings of Equipment, Track and Electrical Men

DECLARING that the electric railway companies are the only big organizations in the world in the business of selling a product that do not have sales managers, W. L. Goodwin aroused the one hundred members attending the Indianapolis meeting of the Central Electric Railway Association on Dec. 2 and 3 to a new conception of the idea of applying merchandising principles to the business of selling transportation. His address on co-operation within the industry and how to sell its product to the public proved to be the outstanding feature of a program interesting and instructive throughout. Addresses were also made by B. J. Mullaney, on publicity, and by Charles B. Scott and Edward C. Spring on safety work.

The only business matter of importance passed upon by the association was the adoption of a by-law amendment whereby there will be two meetings a year instead of three. These two are to be held on the fourth Thursday and succeeding days of January and July, the January gathering to be the annual meeting. An important executive committee matter was the election of L. E. Earlywine, assistant secretary, to succeed A. L. Neereamer, deceased, as secretary of the C. E. R. A. and of the subsidiary accountants' association, as well as chairman of the subsidiary traffic association.

Mr. Goodwin, General Electric Company, though thoroughly well known in the electrical field as the genius behind the great co-operative movement between the central stations, electrical manufacturers, jobbers, dealers and contractors which started on the Pacific Coast and is spreading over the whole country, came to the meeting of the electric railway men almost an unknown, save to the program chairman, Harry Reid, president Interstate Public Service Company, Louisville, Ky., who is active in the power field as well as the railway. Judging by the discussion that followed the session at which Mr. Goodwin talked, the thanks of the association are certainly due Mr. Reid for bringing this speaker's ideas and personality into the railway field.

SALES CO-OPERATION IS NEEDED

Getting into his subject, scheduled on the program as "Co-operation," Mr. Goodwin said that the test of business men over a long period of years is whether they are a success or a failure. If they are not making a profit in their business, he declared they are failures. He said there had been a tendency in the electric railway field to assume that all the wrong was on the side of the public, whereas in the light of the above test, the large number of electric railway properties in the hands of receivers might point out that there were some things wrong within the industry.

Co-operation within the industry itself, as the groundwork necessary for placing the industry in a position to sell its produce to the public successfully, was urged by the speaker. But co-operation cannot be successful unless the individuals co-operating are successes, he said, otherwise the effort results in a group of co-operating failures. No matter what a product may be, how good or how useful, it has no value unless there can be agreement on the fundamentals of the product. He though that the notable lack of agreement in the electric railway industry was the principal reason that the street railway companies are so misunderstood by the public. The public does not understand this mysterious thing called "service" and does not appreciate that it is receiving what is actually good service or poor service, because a yardstick for measuring the quality of service has never been found. And somehow electric railway men have never been able to give the story of their service to the public in a way understandable by it.

He compared this inability of the layman to understand that what he was getting might really be good service, though condemned, to the contract for power which the average central station requires a man to sign. The contract has printed matter on both sides of the form containing a lot of technical terms and conditions about load factor, kilowatts load, volts and amperes, about which he knows nothing. But since the company is the only one in the community from which he can buy power, he blandly signs the contract and permits what he considers a "meter cheater" to be installed on his premises to record what his bill shall be, and he has no measure that he can use to check the meter. The speaker said that the difficulty is that the men in these utility businesses are technical people, all absorbed in the engineering problems, and they deal with so many things mysterious to the public that it looks upon them with suspicion. It is as though they talked a different language. There is no way to explain street car service, and we can't say to the public, as a prominent railway man of another day is reported to have done after a period of ceaseless criticism, "If you don't like our service why the h—— don't you walk?"

This suspicion of the general public about things electrical, including the street railway, Mr. Goodwin said, has been intensified by the fact that the utility men have for years been at discord with one another and have been trying to sell their own product by discrediting that of the other fellow. As practical business men in the business to make money, we must agree in the family on how our product shall be sold, he argued. The reason people are unwilling to pay a fair price for our product is because we are poor salesmen—we have not learned how to sell transportation. The first thing to do is to get the house in order, agree on a common story and then go out and tell it. And in going out to get the people to help solve our problems, we cannot expect much success unless we help them solve theirs. By this, the speaker meant that not only should the railway officials be members of the Kiwanis, Rotary and other civic clubs, but they should be leading spirits in those clubs and in every other civic movement and any general cause of the public.

Mr. Goodwin said that the electric railway companies hold the singular position of being the only business in the world that does not have a sales manager. He thought this was why there were so many companies in receiverships. In this connection he pointed out that the railway officials have been completely occupied with the problem of getting the cars over the lines, and there has been no one whose duty it was to sell the service. He said the companies have got to have sales managers whose sole duty it is to go out and sell rides and make the people like them and pay a lot more for them. Publicity, he said, is only one of ten thousand ways of selling the commodity, though it is an exceedingly important method. Of all the methods, the spoken word is the best, for it starts the mind going and the printed word keeps it going.

Mr. Goodwin said that a man who has a commodity to sell and does not talk about it is lacking in faith in it. One cannot sell anything unless he believes in it, and he cannot believe in it unless he "has got the goods."

Continuing his argument, Mr. Goodwin said that no man in the electric railway business can be an operating man, an engineer, a mechanic, a financial man, and in addition be a sales manager. This simply is an impossibility. The mental attitude of mind of the man who sells and the man who manages are entirely different. He insisted that one cannot compromise principles, and that sales work and management are two different principles and cannot be compromised. A sales manager must be an enthusiast, he must know all of the good points about the thing he is trying to sell, and while knowing any possible flaws, he must be skillful in keeping the customers' mind on the good things so that they won't think of the possible defects, and he must go out and talk his product from morning until night. On the other hand, the executive must be a cool, calm man who will direct operations and watch results.

Henry Ford and John Wanamaker were referred to by the speaker as the greatest of all business men in the country, yet each has included in his organization the best sales manager that he can secure. A man may be ever so good an operating railway man and yet as a salesman be nothing. Mr. Goodwin expressed a very earnest desire to see a sales manager brought into the organization of the electric railways.

He then told the audience how he had talked about the utility business to some four hundred business men of South Bend, Ind., a few days before, gathered under the auspices of the Rotary Club. In repeating part of the speech he had made, he demonstrated how the problems of the utilities can be told to the public and how the public can be sold on the utility by one who is free from all the operating responsibility and has the salesman's instinct. He concluded by saying that if every one would do his bit in thus selling the industry, the effort would ultimately create a psychological state of mind that would enable the electric railways to win.

MR. MULLANEY TALKS ON PUBLICITY

An address on publicity by Bernard J. Mullaney, public relations manager People's Gas, Light & Coke Company, and director Illinois Committee on Public Utility Information, was presented to the association at the beginning of the afternoon session on Dec. 2, and was followed by Mr. Goodwin's talk. Harry Reid presided at this session.

At the outset of his address Mr. Mullaney declared that he did not particularly like the term "publicity," the title of his address on the program, but he said that up to this time no better word has been invented to describe the idea which he meant to convey. He then outlined ways and means of educating the public, but the best channel of all, in his opinion, was the newspaper. The utility manager is seldom a good judge of what the newspapers want. He sees only one side of the case and is apt to see that so earnestly that his judgment of the other side is obscured. It is practically essential to get the assistance of men who are used to looking at the public side and who have had training and experience in writing for the public, and facts, not arguments, should be the foundation of all publicity efforts in behalf of the public utility industry. From them will come the kind of public opinion that is wanted—an informed and well-grounded and stable public opinion.

The place to start giving educational publicity matter used, established and made effective is in the home town newspaper, and the person to get it started is the local utility manager. The way for him to start in the home paper is by using the columns of that paper to advertise his business. Many managers of public utilities think they have nothing to advertise unless they happen to have gas or electric appliances to sell, that the use of their transportation or other utility service comes automatically and that the public must use it or do without. This is an error, because advertising in the columns of the home town paper cultivates goodwill on the part of the public. The newspapers also want news, and if the company is doing anything or if the officers as individuals are doing anything that will be news to the community, the newspaper publisher should be told about it. The manager should also be an active factor in the community life of the town where he operates.

In conclusion, the speaker told about the work of the Illinois Committee on Public Utility Information, after which had been patterned eight or ten similar enterprises in neighboring states. The Illinois committee has been at work for about a year and a half and sends out regularly informational material ready for use in the newspapers, prepares speakers' bulletins and is prepared to furnish other information about utilities on request. The State University has asked for and receives 300 copies of everything the committee prints. Results are effected in a multitude of ways, and those obtained in Illinois can be duplicated whenever or whereever an effort is made. The Illinois plan may not be the only one or the best one that can be found, but it is a plan which works and it is the only plan that is producing observable results anywhere in the country. These results, the speaker thought, would be cumulative and ultimately the public utility industry should be made as safe and immune from unfair political attack as the churches and public schools.

BUSINESS SESSION ON THURSDAY MORNING

At the opening session on the morning of Dec. 2, President Robert I. Todd and both vice-presidents of the association were absent because of engagements with local authorities or the state commissions, from which they could not be excused. C. N. Wilcoxon, president Chicago, Lake Shore & South Bend Railway, and a former president of the association, was therefore invited to preside. The chairman explained that the principal speaker on the program for the morning, James P. Barnes, president Louisville Railway, had been unable to be present on account of important fare hearings.

H. H. Buckman, master mechanic Interstate Public Service Company, Scottsburg, Ind., made a progress report as chairman of the standardization committee of the C. E. R. A. At the time of the Ottawa Beach meeting last June he had been forced to report his inability to get the members of the committee together, and by motion of the association the president had been instructed to impress upon the members of the committee the importance of this work and their duty to take active part. Mr. Buckman reported that following this meeting President Todd discharged all members of the committee and then later reappointed the same men. The effect was helpful, Mr. Buckman said, but he had yet been unable to get a full attendance of the members. He pointed out that one of the first things the committee was endeavoring to do was to make available in proper form for use by manufacturers the standards of the association already adopted. He said that when C. E. R. A. standards were now specified to the manufacturers, the latter were unable to find out what these standards were because the records were incomplete and no drawings available. This applied to wheels in particular. Consequently, in order to use the standards, it was necessary for each company to make up its own drawings, which was an expensive process.

C. E. R. A. STANDARD WHEELS HAVE GOOD RECORD

In reference to the value of the C. E. R. A. standard for wheel contour, he said that records had been taken to show that wheels purchased with the A. E. R. A. standard contour had given 47,000 miles of service, and upon the first turning, at which time the wheels were brought to the C. E. R. A. standard contour, they had given 54,000 miles service before the second turning was necessary, showing the relative efficiency of the two contours. He pointed out that the association had adopted standards for axles, wheels, brake shoes, trolley wheels, end connections, couplers and several other things, and that the records should be made available so that these standards could be freely used if good, and if not, the committee should be so instructed. These old records of the company must also form the basis for any new work the committee may undertake, and the chairman felt that not much could be done until this matter had been cleared up, except perhaps for work on the controlling dimensions of cars used in interchange service.

R. N. Hemming spoke of the great need of a standard stop sign for use in cities and the advantages that would be derived therefrom. He told of the very exhaustive study made of this subject some ten years ago, which had been presented to the association and no action taken.

Mr. Buckman then asked the association to give an expression as to whether the committee should work on a design of sign to be used on the span wire on trolley pole, a special sign set in the sidewalk, paving mark or what. Chairman Wilcoxon suggested that the committee submit different designs, pointing out the merits and deficiencies of each, and let the association vote upon the committee recommendations.

Mr. Hemming also called attention to the imperative need for a nationalization of the design of railway crossing warning signs. He said that special attention should also be given to the location of the numerous advertising signs, some of which are combined with a warning sign, for it has been demonstrated that these were sometimes the cause of considerable confusion to the motorist.

REDUCTION OF MEETINGS DISCUSSED

The proposed amendment providing for two meetings a year instead of three, which had been presented at the Ottawa Beach meeting and held over in accord with the constitution for action at this meeting, was then brought up for action. In order to get the matter before the association in proper order for discussion, L. G. Parker, Cleveland Frog & Switch Company, who said he did not know what the idea of making the change was, moved that the amendment be adopted. It was duly seconded and the matter was then discussed by S. D. Hutchins, Chairman Wilcoxon, G. T. Seely, Myles B. Lambert, W. S. Rodger, S. W. Greenland, John Collins, S. W. Crawford and E. F. Schneider, practically all of whom were called upon by the chairman in an effort to bring out the consensus of opinion. Some of these men inclined to three meetings a year and some to the proposed amendment for two meetings, but no one seemed to have any strong conviction either way. When the question was called, the amendment was carried.

The association then took action electing R. R. Cunningham, James C. Jamison, Nelson E. Baxter, Albert L. Wescott, William Visel, G. E. Bell, W. B. Finchert, C. W. Rhodes, J. E. Slimp, William Anderson and A. M. Hartzog as supply members of the association.

In the course of the discussion on the proposed amendment regarding the number of meetings, the suggestion was made by Mr. Lambert, Westinghouse Electric & Manufacturing Company, that it might be desirable to have an independent meeting, either at the time of one of the main meetings or at a separate time, for the equipment men, another for the engineers of maintenance of way, and another for the electrical men. This gave rise to considerable discussion later on, after it had been decided that there should be but two meetings. In this connection, reference was made to the great success of the recent Iowa Electric Railway Association meeting, at which only operating men were in attendance, and to the semi-annual meetings of the equipment men alone of Pennsylvania, Ohio and West Virginia, under a loose organization called the Association of Electric Railway Men. W. G. Brooks gave a brief account of the manner of conducting the Iowa meeting and the highly successful results. This meeting was reported in the issues of this paper for Sept. 25 and Nov. 20, 1920, pages 585 and 1046.

The idea of group meetings wherein men of common interests would get close together in informal round-table discussions to talk over common problems without the restraint which some feel in the presence of the general managers was also discussed by Mr. Parker, C. Dorticos and J. E. Cockran, Lima, Ohio. It developed that there was a strong feeling among some of the members that such meetings were highly desirable for the Central Electric Railway Association. However, no action was taken, though Chairman Wilcoxon remarked that if such meetings were really desired it was up to the electrical and equipment men to make definite proposals of what they wanted.

FREIGHT HANDLING, MARKET PROSPECTS AND MEN

In the absence of the speaker of the meeting, Mr. Barnes, the session was thrown open to the discussion of any subject that any one might have on his mind and M. B. Lambert was called upon. He spoke of the opportunity the railways now have to take an active part in the solution of the transportation problem of the country. He pointed out how exceedingly slow the movement of freight by the steam roads had been. In view of this situation and the fact that inadequate transportation is charged with from 15 to 30 per cent of the cost of living, he pointed out that the time seems particularly propitious for the interurban railways to expand their facilities and relieve the situation by handling more freight and thereby derive more profit from operation.

He felt that the public has come to understand the reason why increases in fares have been necessary and that the crowd psychology is now more favorable than ever to the electric railways. He thought that this also was a reason why the electric railways should take steps to handle more freight, and that if they did not the shippers were going to be more inclined to favor the motor-truck people, who are expanding their facilities at a tremendous rate. In other words, if the electric lines will give the service which they can there will be no disposition to go to the motor truck for shipping facilities. He also expressed the thought that if electric railways show an indifferent attitude toward the needs of shippers for more service there will be a reaction against the electric lines.

Turning to the subject of market conditions, Mr. Lambert said that he was continually asked whether prices for electrical equipment were going to come down. Speaking for his own company, he said that it did not know what the course of prices might be, but as far as could be seen now the only reduction in prices expected is that to come from the greater efficiency of labor.

However, Mr. Lambert said, a company in need of equipment now, but holding off six months for lower prices, should consider this question: Supposing prices would be 10 per cent lower in six months, would this saving offset the loss of revenue which the new equipment would earn in the meantime if the order for it was placed now?

Mr. Lambert directed his further comments to the subject of training men for responsible positions. He said he was constantly asked to suggest some one to fill a vacancy, and as he looked about the country he could not but be impressed with the absence of men being trained and made ready for the day when the men now in charge would be gone. In reference to master mechanics in particular he wondered who there would be to succeed some of the men who now stand out so prominently, for there was no one in their organization "coming along" to fill these possible vacancies. He urged department heads and officials to give this question serious thought.

J. E. Cockran pointed out a very significant situation in connection with the adoption by the electric railways of the Bureau of Standards safety code, which covers the specifications for electrical construction. He said that nine out of ten of the electrical men in the electric railway field do not know the specifications laid down by the Bureau of Standards and that the only reason that steps had not been taken by the bureau to enforce these was the intervention of the war. He said that loss of life, damage to property and delay to traffic were resulting from improper construction and lack of care in adhering strictly to the provisions of the safety code. He urged upon the members of the association that they inform themselves and take steps to bring about the observance of the code voluntarily, rather than to wait until steps are taken to enforce it.

SAFETY DISCUSSED AT FRIDAY'S SESSION

President Todd was able to be present and preside at the final session Friday morning. Charles B. Scott made an address on "Safety," of which an abstract appears elsewhere in this issue. Martin J. Insull, it was learned, who was to have made an address at this session, was prevented from coming by sickness. It had also been planned that George F. Fonda, general supervisor of employment, compensation and welfare, Bethlehem Steel Company, would address the association on Friday on the safety-first movement. An unexpected turn of events made it impossible for him to attend.

Edward C. Spring, general superintendent Lehigh Valley Transit Company, Allentown, Pa., and first president of the Central Electric Railway Association, then addressed the association briefly on the safety drive which his company had put on in a safety week campaign extending throughout the valley served by the property. This drive was described at length in the ELECTRIC RAILWAY JOURNAL for July 10, 1920, page 78, and a number of pictures of the campaign appeared on page 420 of the Aug. 28, 1920, issue. A point of particular interest made by Mr. Spring at the Indianapolis meeting was that the railways are forced by their financial condition to confine their activities almost wholly to those things which cost no money. They cannot go into the safety movement as they ought to and as they would like to, and consequently the time has come for them to place their dependence in what they can induce other industries and the people generally to do in safety-first work, the electric railways acting only as one constituent of all industry.

This was what was done in the splendid Lehigh Valley drive, which is said to have been the most successful and of the greatest magnitude of any safety campaign yet attempted. The significant thing here is that while the campaign cost about $12,000, the electric railway company, with all its subsidiary utilities throughout the valley, had to expend only $300. It should be said, however, that Mr. Spring was the guiding spirit behind the movement, although he made it a point to keep the railway company in the background by appointing a general manager and so organizing the movement as to give the National Safety Council all of the credit and, incidentally, a large share of the responsibility. Mr. Spring urged all the electric railway companies to give active support to the local safety council in their community, and if there was not such an organization at present to take steps to bring about one. The greatest good can be accomplished by getting the people of all lines of activity to talking about safety, rather than to have only the railway employees talking about it.

Mr. Hemming then spoke briefly on the recent statewide safety drive in Indiana, which had been got up on such short notice that there had not been time to make the no-accident week a very comprehensive campaign. However, the way had been blazed for a real drive next year and it was therefore felt that the effort had been well worth while. Mr. Hemming reiterated a thought which Mr. Spring had made, that the people are eager to co-operate in reporting any safety-first activities.

Safety matters were also briefly discussed by J. E. Cockran, James Harmon, New Albany, Ind.; H. A. Nicholl, Anderson, Ind., and Harry Reid.

E. M. Walker Talks on Safety Cars

In Address Before New England Street Railway Club He Gives a Review of Their Service in Terre Haute—Discussion Brings Out Points of New England Practice—Paper on Track Maintenance Also Presented

TWO enthusiastic sessions of the New England Street Railway Club were held upon the subjects of "Track Maintenance" and "Safety Car Operation" at the American House, Boston, Mass., on December 2. At an afternoon meeting Frank B. Walker, chief engineer maintenance-of-way Eastern Massachusetts Street Railway, gave a lantern-slide talk describing recent construction and maintenance work on the lines of that system. Extracts from Mr. Walker's paper and the discussion which followed will be published in a later issue.

After the usual dinner E. M. Walker, general manager Terre Haute Traction & Light Company, Terre Haute, Ind., read a paper on his experience with safety cars vs. the jitney bus.

WHY THE SAFETY CARS WERE INSTALLED

The paper by E. M. Walker in the evening was devoted largely to an account of how the safety car happened to be introduced into Terre Haute and how competition between the railways and jitneys was affected by this change.

According to Mr. Walker the earnings of the Terre Haute city lines had grown steadily through successive years until 1913, after which, yielding to the competition of the jitney, they declined for the next five years. The percentages of decline, based on the 1913 figures, for these years were 2 per cent, 22 per cent, 15 per cent, 13 per cent, and 14 per cent. During the year of greatest decline in earnings a trial was made of the effect of reducing the street railway service, but this only served to increase the popularity of the jitney bus. An attempt was then made to introduce one-man operation on the line of lightest traffic and a few old cars were remodeled for that purpose, but this move was promptly met by the passage of an ordinance requiring two men to a car. An effort was then made to have the jitneys restricted as to routes and schedules and licensed and bonded as to their accident liabilities. This met with no success, and the number of jitney buses continued to increase. Indeed, the drivers formed a union and affiliated with the Central Labor Union, although most of the drivers were owners of their own cars; in other words, were proprietors or capitalists as distinguished from workers. This distinction was not thought of, however, and the effect of the organization was to insure strong support from the friends of organized labor.

A petition was then presented to the Public Service Commission of the State asking that body to assume regulatory control over the jitney bus as a common carrier, but the commission refused to take jurisdiction. At that time commission regulation in Indiana was in its early days and the jitney business was a new business. By 1918 there were 200 jitneys in operation. To use a figurative expression, the streets had grown too small for them, and it was evident that something would have to be done to restrict their use in the downtown streets. At length the City Council on its own initiative passed a restrictive ordinance which was so unpopular that the jitney drivers went on strike for two weeks and the ordinance had most of its teeth pulled when it was repassed.

By that time the railway company had lost hope of any assistance from without and decided to approach the matter solely on a competitive basis. It proposed to the Council that it would purchase thirty new Birney safety cars if the two-man ordinance of an earlier date was repealed, and this was done on Dec. 1, 1918. Results from the first were very encouraging, and the company quickly found that it needed more cars, so it kept on buying them until now the city has 100 per cent safety car operation and a total of sixty-eight cars. The number of cars operated has been increased 55 per cent, the car-miles 60 per cent, the gross revenues over 65 per cent, and the earnings per car-mile over 10 per cent. In the meantime the jitneys dropped in number from 200 in 1918 to the present number of twenty-three. Of this number only seven are operating in competition with the street railway lines and they only during the hours of heavy travel. The sixteen others operate on a non-competitive line. All of these jitneys carry taxi signs and are generally on the lookout for that sort of work.

The speaker did not claim that this experience could be repeated anywhere or everywhere. He said it took a little patience, a little courage and a whole lot of faith, but the results justified the mixture. Doubtless also the high costs of gasoline, oil, tires and general repairs had their share in discouraging jitney competition, but this does not detract from the efficacy of the safety car as a successful competitor.

In his opinion restrictive or repressive measures will not be permanently effective in overcoming jitney competition. Regulations putting the jitney buses on the same operating basis as the street cars can be made much more effective, as, for example, the requirement of a payment of a fixed tax on a measured mileage basis for repair and maintenance of street pavements, the requirement of adherence to fixed schedules and routes, the operation of a fixed number of hours per day every day, and lastly the giving of transfers from line to line. These measures, if resorted to, would make more nearly equal the basis of operation and there would be little room for doubt as to the final outcome.

At the close of his address Mr. Walker explained, in answer to questions, that there had been no increase from the 5-cent fare during the period described in his talk, that the men, who were not unionized, took kindly to the car and that the total number of employees was now really larger than in the two-man period, owing to the increase in traffic and shorter extra lists.

DISCUSSION ON MR. WALKER'S PAPER

Walter Jackson, New York, being called upon by the chairman, declared that one-man operation has reached the stage where it is no longer a debatable subject. Any man who does not believe that a company can save money by running a car by one man instead of two and can create traffic by running two cars instead of one is hopeless at this time. The one-man car, of course, is not suitable for all situations. Where there are great tidal waves of traffic big cars and even trains are necessary, but there is room for some one-man car service in every city. Where it is possible to eliminate the awkward collection of odd cash fares or where people can pay their fares before they come on the car, as in prepayment areas, the field of the safety car is widened. It is even possible in large cities where the prepayment area idea has been worked out extensively to use very large one-man cars because the operator of the car has little else to do but to run it, the passengers having paid their fare before they got on. It is an anomaly to have a conductor on that car at all, because there would be nothing for him to do. The speaker also called attention to the fact that Terre Haute had had an enormous increase in the number of private automobiles during the period considered by Mr. Walker and coincidentally with the increase in safety cars there had been a corresponding decrease in the number of jitneys. The private automobile, instead of injuring the street railway, has increased the street car riding habit in Terre Haute. A man who owns a car is the very man who will take a street car for three or four blocks because he is used to stepping into a vehicle and being carried a trifling distance.

H. F. Fritch, assistant general manager Eastern Massachusetts Street Railway, Boston, said that that company was also headed fast toward 100 per cent one-man operation. The company now has about 200 Birney cars, 200 double-truck cars fitted for one-man operation, and about 250 double-truck two-man cars in daily service. One hundred of these cars will be converted to one-man operation. In addition 50 more Birney cars are being put in service as rapidly as possible. The Birney cars are being used in the main on the short lines where there is one fare or at most two fare collections. The double truck cars in general are being used on the longer lines. These cars seat from forty to forty-four passengers. They are fairly modern cars with either hand or pneumatic appliances for operating the doors. The only change made in them for the collection of fares was to change the location of the box stanchion so that it would be more in front of the operator, and to put in an arrangement so that in case of emergency the rear door could be opened by the man in front. The operation of these double-track cars by one man has been approved by the Public Service Commission with the proviso that before May 1, 1921, they should be equipped with certain safety devices. At present, therefore, the company is making very rapid progress toward 100 per cent operation of safety cars. The ideas of the company as to the possibilities of one-man car operation have changed since it started to put this style of car on the road. The company began with the car on city lines, but it has now been extended to all sorts of lines, city and suburban and interurban. The cars have been successful on all. One of the hardest problems was the question of the collection of multiple fares. The company has zones of practically 2 miles in length. In city service the collection problem usually can be solved according to the condition of each particular line. At present the company has very few lines which it does not anticipate can be made one-man car routes.

George E. Haggas, chief engineer Cumberland County Power & Light Company, explained that that company had twenty-seven one-man cars, of which twenty-three are of the Birney safety type and four are remodeled two-man cars, equipped with safety devices. Where these cars were introduced on lines formerly operated by two-man cars the service was increased, in some cases it was doubled. On the whole the operation of the cars has been quite successful. During the severe snowstorms of last winter the company was able to operate safety cars as easily as two-man cars.

Frank I. Hardy, manager Salem division Eastern Massachusetts Street Railway, pointed out that in certain country sections on that system there had been no increase in population during the past twenty years and that a safety could not only handle all the traffic but would be the only means of preventing the abandonment of lines. The use of one-man cars had been followed also by a decrease in the peak load demand at the power stations. The speaker cited a case of a line 9.15 miles in length with four fare zones. During the summer months there is heavy riding on this line, yet there has been no trouble in operating small safety cars and collecting four fares on this line. The distance, 9.15 miles, most of which is in some settlement or village, is covered in fifty-seven minutes.

B. C. Richmond, general manager Berkshire Street Railway, Pittsfield, Mass., said that he had had for about a month fifteen safety cars in operation and was substituting that type of car for the double-truck car as rapidly as possible. Some of these cars ran on routes where there were more than two zones. The double-truck car was still being used on the long interurban lines and to some extent in rush-hour service. The company and public are well pleased with the safety cars.

Carl H. Beck, Safety Car Devices Company, spoke of an address which he had made before the club two years ago on the subject of safety cars. Now all the testimony in regard to the operation of these cars is favorable, and members were speaking of the operation by one man of double-truck cars.

Charles H. Johnson, superintendent of railways Bangor (Maine) Railway & Electric Company, said that that company had operated sixteen safety cars for the past two years. They are equipped with scrapers. During last winter they gave better service than the heavy cars. The company would not think of changing back to the old cars.

E. M. Walker, the speaker of the evening, then, at the request of one of the members of the club, explained how the purchase of the cars in Terre Haute was financed. The first thirty cars cost about $165,000 or $170,000 and were bought on a car trust equipment plan through bankers in Indianapolis. When the next twenty-five cars were purchased the bankers asked that 25 per cent of the money should be raised in Terre Haute. This was done. The next order, for ten more cars, was in March of this year and all the money required was borrowed for five years at 6½ per cent from Terre Haute bankers. In this case the company furnished 10 per cent of the money, and as there have been three increases in the prices of the cars since they were bought the equity is even greater than that per cent.

Commenting then on the paper presented during the afternoon by Frank B. Walker, E. M. Walker said that while there is not very much cold weather in Terre Haute the company had fifty-five rail breaks last winter, and of these only four occurred on the 55 per cent of trackage over which safety cars are used exclusively.

He also said, in reply to a question on accidents at Terre Haute, that while the total number of accidents reported for the safety cars has been slightly more than with the two-man cars, the cost per thousand car-miles has been just half of what it was with two-man cars. Personal injuries, which are the hardest to settle, have practically disappeared because of safety car operation.

SAFETY CARS IN EASTERN MASSACHUSETTS

Frank B. Walker, chief engineer maintenance-of-way Eastern Massachusetts Street Railway, said that he had not taken up one-man cars in his talk during the afternoon because he knew they would be considered in the evening. He explained that when these cars were being considered the company was uncertain as to how much work would be needed on the track because the cars had a very long wheel base, whereas the track had many curves of as low radius as 50 ft., 40 ft., and even 35 ft., with some low joints and special work in the condition in which it would naturally be on an old railroad. Actually it was found that the safety cars were very easy on the track and the repairs required light. In some track formerly discontinued but now being rehabilitated for one-man car operation the company is putting in ties 5 ft. apart.

A rising vote of thinks was then extended to "the team of Walker and Walker" for the addresses of the day. The meeting then adjourned.

Engineers Discuss Burning of River Coal and Culm

River Beds of Pennsylvania Anthracite Region Contain Vast Store of Valuable Fuel Once Considered Practically Worthless

ON DEC. 3 the Engineers' Club of Philadelphia held a meeting devoted to a discussion on utilizing fuel formerly considered as waste. Interest centered in "river coal," of which there is a vast supply in the beds of the rivers which flow through the Pennsylvania anthracite region. The recent development of apparatus for pulverizing and burning river coal, culm and other "waste" fuels lends special interest to this subject at this time.

The first speaker at the meeting was Dr. George Ashley, State Geologist of Pennsylvania, who explained that the vast supply of coal now available in the river beds was washed there by the discharge from the mine washeries. The coal is carried long distances in the rivers, especially during high-water periods. In many cases the tributaries of the main rivers have become practically filled with this coal. Much of the river coal is of the grades known as "rice" and "barley," although a large part of it is merely dust. For some years this coal has been reclaimed on a small scale, but only during four or five years has the reclamation reached large proportions. In 1919 a total of 2,000,000 tons was reclaimed.

One of the largest sources of the coal is the bed of the Susquehanna River near Harrisburg, where 750,000 tons is recovered annually. In fact, practically all of the coal used in Harrisburg for industrial power and utility power purposes is pumped from the river bed. The preferred method of recovering the coal is to pump it from the bottom of the river by means of a steam-driven centrifugal pump mounted on a flat-bottom boat. The pump discharges onto a screen which rejects sand and very fine coal, delivering the larger sizes to a barge. In the river tributaries the method is to build small dams, behind which the coal is pumped. Clamshell buckets and steam shovels are utilized to gather up the coal.

Dr. Ashley's opinion was that at the present rate of mining there is enough river coal now in sight to last for from four to ten years. The supply will be added to as the dumps of the mines are worked over. J. P. Edwards followed Dr. Ashley, differing from him in estimating the available tonnage of river coal. From Mr. Edwards' experience, he estimated that coal is being deposited at the rate of 8,000,000 tons per year and he told of one of his reclamation stations where the deposits are 10 ft. deep. A crane which he installed on a river bank to operate a 1½-yd. clamshell bucket with a 25-ft. digging radius has in three years removed 140,000 tons of coal from the comparatively limited area which it commands.

RIVER COAL IS OF HIGH GRADE

Mr. Edwards felt that the supply of river coal has only begun to be utilized. It is of good grade and can be secured at less than one-half the cost of bituminous coal. Tests show a heat content as high as 14,000 B.t.u., although in general it will run around 11,000 to 12,250 B.t.u. with an ash content of 13 per cent. Mr. Edwards' arguments were confirmed by D. R. Delamater, who emphasized the necessity of equipping boilers to burn smaller sizes of coal than at present and even coal dust. He said that he had seen river coal burned with only 10 per cent waste in ash.

Taking up the subject of pulverizing anthracite coal, R. M. Vail said that success in burning anthracite would be found in taking advantage of its brittleness and avoiding its abrasiveness. Touching the burning of powdered anthracite, J. R. Wyllie told of obtaining more than 400 per cent rating from boilers with this fuel and operating them for days at 300 per cent rating. He had been able to obtain very high percentage of CO_2, but thought that excessive CO_2 is hard on the furnace. He said that in burning powdered anthracite 90 per cent of the coal should go through a 200-mesh screen.

W. W. Pettibone gave experience of the Bethlehem Steel Company, Lebanon, Pa., in burning pulverized coal. This company has four 520-hp. boilers in operation, burning pulverized bituminous coal. The pulverizer used satisfactorily on bituminous coal was soon worn out with anthracite, but Mr. Pettibone believed that pulverized anthracite can be burned successfully. He had obtained boiler efficiencies averaging more than 80 per cent in regular service, with coal ranging from 11,000 to 13,000 B.t.u. At times efficiencies from 82 to 87 per cent were secured.

At the meeting there was discussion on the use of briquettes, and J. H. Kennedy outlined the requirements of a successful briquette. This, he said, must be waterproof, hard but not brittle, and able to "stand up" in the fire while burning. He told of some briquettes that are being manufactured from 92 per cent culm and 8 per cent binder, the latter containing twelve parts water, two parts asphaltum and one part starch. Such briquettes can be sold at $8 per ton f.o.b. factory. This fuel requires less draft than common grades of coal.

Technical Features of the Motor Bus*

Fuel Economy, Standardized Equipment and Bus Types Are Discussed by an Experienced Motor Bus Engineer

FUEL economy in motor bus transporation is a fundamental problem and also a business barometer, in the opinion of George A. Green, general manager of the Fifth Avenue Coach Company. The newly installed research department of this company has completed experiments which indicate a net gain of 18 per cent in the yearly fuel bill, which in round figures represents a saving of $90,000 annually. The changes necessary to obtain this economy are comparatively inexpensive and may be tabulated as follows:

1. The adoption of thermostatic hot-air control.
2. The adoption of a system permitting more complete control of idling speeds.
3. The employment of automatic instead of fixed spark advance.
4. The elimination of gasoline tank evaporation losses by the use of a proper valve.
5. The introduction of a little exhaust gas into the inlet manifold.
6. The modification of the exhaust pipe and silencer layout with the object of reducing back pressure.

Mr. Green states that 18 per cent is a very conservative estimate of the saving that can be obtained by the above methods. A greater saving is obtained by attention to fuel economy than can be obtained with any other item in connection with maintenance. The two factors in such economy are the machines and the operators; the machines should operate at maximum economy and the employees should have the idea of high gasoline averages instilled in them. The greater problem is encountered in dealing with the employees.

Differentiate Between Jitneys and Organized Company

In dealing with jitneys Mr. Green points out that there are marked differences between a jitney company and the Fifth Avenue Coach Company, which caters to a lasting business and gives service at all times. There is more to the operation of a motor bus company than the purchase of stock vehicles and the operation of these vehicles only when traffic is heavy. Such a procedure can only result in failure and in causing a setback to a promising industry. In general the Fifth Avenue Coach Company loses money on 30 per cent of the mileage. In wet and cold weather the seating capacity is cut in half, and it frequently happens that an entire day's operation results in a monetary loss.

Mr. Green states that the motor bus industry is in its infancy, with almost unbounded possibilities for improvement, which is not true of other forms of surface transportation. In connection with transportation he points out such features as the large amount of time and money required to secure a competent operating personnel, the large and expensive supervisory force, the complexity of schedule making and its direct effect on income, the volume of motor bus traffic on streets that are already congested, and the difficulties of winter operation. He lays stress on the fact that unified control, a highly trained technical organization and a 10-cent fare are fixed and necessary factors.

Pneumatic Tires Experimental

The pneumatic tire has been tried out as an experiment by the Fifth Avenue Coach Company on the double-deck buses and Mr. Green states that many of its disadvantages result from its large diameter. Among the disadvantages of the pneumatic tire from the motor bus standpoint are:

1. The center of gravity is made higher, with resultant greater possibility for overturning.
2. The increased height makes more possibility of injury to passengers on the upper deck because of striking overhead obstacles.
3. There is very great difficulty in obtaining a low level loading or unloading platform.
4. The weight of the pneumatic tire equipment is greater than for solid tire equipment of the same carrying capacity.
5. The inside seating capacity is decreased because of the large size of the wheel pockets.

The pneumatic tire is much more comfortable for the rider, but no great increase in speed can be obtained because of street congestion and traffic rules, especially on Fifth Avenue. The pneumatic tire permits of fuel economy and lower maintenance costs, but for the Fifth Avenue Coach Company these economies would not offset other increased costs introduced by the use of pneumatic tires. Mr. Green states that there is, however, a very fruitful field for the pneumatic tire in connection with the single-deck bus and suggests two improvements in the design of pneumatic tire equipment:

1. Over-all diameters should be nearly equal to those of solid tires on the same carrying capacity basis.
2. Demountable wheels and not rims should be used.

From the standpoint of the motor bus 8, 9 and 10-inch tires are out of the question. The small diameter pneumatic tire on demountable rims will reduce the unsprung weight which is a vital factor, and Mr. Green suggests the use of aluminum hubs to obtain still less weight. The present weight per passenger of the double-deck bus is 200 lb., which includes all equipment on the bus, even to oil, water and fuel. Each bus makes an approximate yearly mileage of 30,000.

In concluding his discussion Mr. Green states that more attention should be paid by the Society of Automotive Engineers to the human side of organizations, as the experience of his company indicates that bad design or material does not mean failure so much as a bad organization. Where co-operation and team work are lacking all the engineering skill of the best men in the industry will not make for success, where success means a condition which permits of satisfied workers and at the same time a fair return on capital.

H. M. Crane in his discussion of the paper by Mr. Green points out that the truck today is a side line in that it is not a thing that makes money for a business, but an accessory where the matter of economy in operation is not serious. He states that a very successful truck might lack almost every good engineering point except the important feature that it transported its load over the road. The fact that a 10-cent fare is fixed for the transportation business is the stimulus that should and does bring out improvements in motor bus design and operation.

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*An abstract of a paper on motor bus transportation delivered at the summer meeting of the Society of Automotive Engineers by George A. Green, general manager and engineer of the Fifth Avenue Coach Company of New York, was published in the July 24, 1920, issue of the ELECTRIC RAILWAY JOURNAL. The discussion of the paper published in the November issue of the *Journal* of the Society of Automotive Engineers brings out some added points of interest which are abstracted for the benefit of the readers of the ELECTRIC RAILWAY JOURNAL.

Echoes of the P. C. A. A. Convention

Pacific Claim Agents' Association Held Annual Meeting at San Diego—Abstracts of Several Papers Are Given This Week

THE annual meeting of the Pacific Claim Agents' Association was held at San Diego on Sept. 22 to 24. Abstracts of the following papers which were read at the meeting are given below: "The Carelessness and Negligence of a Driver Cannot Be Imputed to His Passenger or Guest," by Arthur L. Levinsky, claim agent Stockton Electric Railroad; "The Best Method of Obtaining Statements of Accident Witnesses Whose Names Are Not Secured by the Trainmen," by J. H. Handlon, claim agent United Railroads of San Francisco; "Should Accident Prevention Standards Be Adopted?" by H. G. Winsor, claim agent Puget Sound Electric Railway, Tacoma, and "The Claims Man and the Public," by B. F. Boynton, claim agent Portland Railway, Light & Power Company.

As a result of the election and of the holding over of officers and executive committee members whose terms did not expire, the list of these governing groups for 1920-1921 now stands as follows: President, Charles A. Blackburn, Butte Electric Railway, Butte, Mont.; first vice-president, John S. Mills, San Francisco-Oakland Terminal Railways, Oakland, Cal.; second vice-president, Frank D. Oakley, Tacoma Railway & Power Company, Tacoma, Wash.; third vice-president, S. A. Bishop, Pacific Electric Railway, Los Angeles, Cal.; secretary and treasurer, B. F. Boynton, Portland Railway, Light & Power Company, Portland, Ore.; executive committee, J. H. Handlon, chairman, San Francisco, Cal.; Thomas G. Aston, Spokane, Wash.; C. M. McRoberts, Los Angeles, Cal.; A. M. Lee, Seattle, Wash.; H. G. Winsor, Tacoma, Wash.; J. W. Grace, Sacramento, Cal.; W. H. Moore, San Diego, Cal.

SITUATION REGARDING CONTRIBUTORY NEGLIGENCE ON PART OF VEHICLE PASSENGER NOT SATISFACTORY

The question as to whether the carelessness and negligence of a driver can be imputed to his passengers or guests was discussed by A. L. Levinsky, claim agent Stockton (Cal.) Electric Railroad. He said that courts of different states have adopted the rule that the carelessness or negligence of a passenger or guest cannot be imputed to the driver of whatever vehicle the passenger or guest may be in. Hence, large sums of money are annually paid by transportation companies in settling damage claims and this will continue unless steps are taken to obtain relief. The mushroom growth of the jitney and auto-stage service has placed additional burdens on railway companies, which are compelled to pay damages to passengers carried by their competitors on account of injuries occasioned through the carelessness of the drivers of these vehicles.

Mr. Levinsky said that he could not understand the theory upon which the court holds that negligence cannot be imputed to a passenger or guest. To show the attitude of the court toward the matter, he cited a number of decisions. In one Utah case the court granted a non-suit as to the owner and driver of a vehicle but returned judgment in favor of the passenger, because the latter had neither the right nor the power to substitute his judgment for that of the owner as to the operation of his vehicle. The fact that the conveyance was a private one was construed not to affect the question. In a California case involving a collision between an automobile and an electric railway car a passenger for hire was held not to be negligent because the chauffeur was not employed by her and she did not undertake to direct the manner in which the automobile should be operated. It was not denied that a passenger in a vehicle operated by another is bound to exercise ordinary care for his own safety, but in this case, the passenger being a stranger in the city (San Diego), it was held that she was not negligent in failing to call the attention of the chauffeur to the fact that the road crossed a railway track and that there might be danger from an approaching car.

Mr. Levinsky said that in Pennsylvania there is a different rule, a decision cited holding that in a certain case a guest riding with the driver was precluded from recovering for injury received in a collision at a railroad crossing because, being familiar with the necessity for caution at this crossing, he did not warn the driver of his duty to "Stop, look and listen" when the latter failed to do this. In a New York case also it was held that the mere fact that a guest had no control over the horse which was drawing a vehicle did not relieve him of the responsibility of looking and listening for himself and doing all that a careful and prudent man should do under similar circumstances.

Mr. Levinsky quoted at considerable length from a case of Ellis vs. Central California Traction Company, in which he had represented the defendant, because here he had explained clearly his understanding of this whole situation. He pointed out the hardships which are imposed upon a transportation company by inability to impute negligence to a passenger, even though he may be logically responsible to a degree. The District Court of Appeal in and for the Third Appellate District of the State of California ruled that "here as in these cases the plaintiff was a passenger in the vehicle which was struck by a railroad train. He was not the driver of the machine, nor the owner, and had no authority or control over the driver. Assuming the driver to have been guilty of negligence, there is no evidence that the plaintiff participated in or was a party to such negligence. There is no evidence that he volunteered advice to the driver as to the course he should follow after the moving freight train hove in sight of the driver and the passengers. In fact, there is no evidence that he did or said anything which contributed in any measure or in any way to any negligence of which the driver might have been guilty."

Mr. Levinsky's contention was thus not sustained by the court. He said, however, that in accordance with the decisions which he had cited it would seem that if the driver be so negligent that he cannot recover, it is but a fiction of the law to say that the passenger has no control over and cannot direct the driver, and by reason thereof notwithstanding the negligence of the driver the injured passenger or guest can recover. The corporation does not know who the owner of the vehicle is, and were it not for the rule which is now being opposed it would really make no difference whether the owner was driving the car or stage or not; but by virtue of the rule electric railways are placed at the great disadvantage complained of.

Mr. Levinsky closed by suggesting that the members of the association take the matter up with their respective law departments, looking toward the formulation of an amendment to the statute covering the matter. He recognized the difficulty of drafting a law that would be constitutional, would not be too sweeping in character, and would accomplish the purpose of the electric railways in decreasing the number of claims that seem to them unwarranted.

Getting the Names of Possible Witnesses

Mr. Handlon said that when the topic concerning the best method of obtaining statements of witnesses to accidents when their names are not secured by trainmen was assigned to him he thought that it might be beneficial to enlarge it to cover original methods used in obtaining additional witnesses' names. Therefore, he included some comments as to the importance of locating and interviewing persons who were not eyewitnesses of an accident but who have knowledge of the conditions existing at the time of the accident and of developments immediately thereafter.

Others than passengers are often the best witnesses, especially as to such accidents as collisions with vehicles and pedestrians. A person on the street has a better general view of collisions than a passenger. He can more accurately determine such things as speed of vehicles, their direction, the exact location of the accident, the point of contact, the distance that vehicles traveled after a collision, etc. In the event of pedestrians being struck, fellow pedestrians are more likely to give an accurate detailed description of the occurrence than passengers, and their testimony is very convincing. Trainmen, therefore, should be urged to secure the names of street witnesses immediately after the occurrence of an accident.

Another point made by Mr. Handlon was that claims department representatives should visit the scene of an accident to obtain the names of additional witnesses. If this cannot be done the same day it should be done at about the same hour the following day, because drivers of vehicles, newspaper carriers, mail carriers and others who might have witnessed the accident are likely to be found in the vicinity at about the same time the following day. Again, a house-to-house canvass may produce results, as it is not unusual to locate witnesses on streets parallel to that on which an accident has occurred, especially where the rear of a building faces the scene of the accident.

The testimony of persons who may not have seen an accident is often valuable, especially in verifying other testimony. Police reports and hospital records should also be carefully scrutinized to secure names of witnesses, and in the most important cases advertisements can be inserted in the newspapers. The names of persons riding on cars at points other than that at which an accident occurred should be secured. Passengers who did not witness an accident can give valuable testimony as to speed of car, ringing of warning gong, exact location of an accident, etc.

Mr. Handlon said that considerable trouble is experienced in locating witnesses where the address given is either incorrect or illegible. Hence trainmen should be instructed carefully to examine the witness' signature and address in the presence of the witness. They should also be requested to obtain the local addresses of out-of-town witnesses. He had found certain instructions to investigators to be helpful when addresses seem incorrect: Examine city and telephone directories, see whether street has been renumbered, try transposing house numerals, examine address under microscope, etc.

Finally, Mr. Handlon said that witnesses will usually make a statement if their sense of fairness is appealed to. As to the signing of statements which witnesses have made and approved, in case the witness refuses to do this sometimes he will tear off and retain a corner of the sheet on which the statement is made as a means of identification.

Big Program for Safety Standardization

Mr. Winsor began his paper with an affirmative answer to the question: "Should accident prevention standards be adopted?" He outlined his paper as divisible into three parts relating respectively to: (1) Some of the conditions which appear to make such action imperative; (2) the efforts that have already been made, together with the results secured, and (3) suggestions regarding methods which could be employed in working out suitable standards.

Under the first head he gave numerous statistics to prove the seriousness of the accident situation in this country today. He said that there must be many descendants of the famous King of Israel named Jehu, who was blamed for fast driving. Once the reputation of this king was reflected in the remark of the watchman on the tower of the city of Jezreel who saw a company of warriors approaching the city and who said, "I see a company and the driving is like unto the driving of Jehu, the son of Nimshi, for he driveth furiously."

As to the progress made in accident prevention, Mr. Winsor traced the history of the National Safety Council and told of some of its accomplishments. He said that fatalities resulting from industrial accidents had been reduced from 35,000 in 1918 to 25,000 in 1919.

Again, the state governments have passed laws which tend toward the standardization of safe practices. In Washington, for example, the State Safety Board has adopted the following provisions as standard: (1) A safe place to work, to be termed "safe place" standards; (2) the making of machinery, apparatus and appliances safe to work with, to be termed "safety device" standards; (3) the education and training of employer and workmen to avoid danger and to appreciate the advantage of compliance with the principles of the safe-place and the safety-device provisions of the safety act, to be termed the "educational" standard. Since the passage of this law the state board has issued two safety codes covering respectively general safety standards and educational safety standards.

Mr. Winsor referred with appreciation to the action of the American Electric Railway Claims Association, at its 1920 Atlantic City convention, in ordering the reprinting of a paper read by C. M. Talbert at the 1919 National Safety Congress, a paper which described the St. Louis plan of public safety.

As to the production of safety standards, he quoted Charles E. Oakes of the United States Bureau of Standards, as follows: "A truly national standard can be secured only through an agency which can co-operate with all interests and can co-ordinate their thoughts and efforts. The nationalization of safety methods and practices should be brought about by co-operative means and the body charged with this work should have no legal status whatever in the enforcement of its standards. They should stand on merit alone. This is distinctly a public service. That it is a monumental task cannot be doubted, but assurance must be given that it will be promoted without danger of lapses in activities. It will be realized that the initial preparation of a set of standards is only a beginning of the work. It must be developed and revised from time to time and its application and practice followed up by an agency which can make interpretation whenever necessary."

While Mr. Winsor expressed appreciation of the work on safety standards which is being done through the United States Bureau of Standards, in co-operation with representatives of the National Safety Council and the American Engineering Standards Committee, he thought that this movement is principally devoted to standardizing the various codes which apply to industrial safety. He felt that the federal government should take steps to provide adequate safety laws, calling to its aid any agencies required and seeking the co-operation of organizations and individuals best equipped to assist in the work. Failing of this, he suggested that the scope of the work now being undertaken by the National Safety Council and others to establish safety councils be enlarged, and a general conference called; this in addition to representatives from national associations interested, to include such other representation as progress in the work demands. This conference, he thought, should meet annually and its purpose should be to create and develop suitable standards which can be adopted and enforced locally.

Mr. Winsor's final suggestions were that the Pacific association go on record as favorable to immediate and continued action which will establish suitable and practicable accident prevention standards, both industrial and public; that the National Safety Council be requested to use its best efforts toward that end, and that the association pledge to such an undertaking unqualified support.

CLAIMS MAN MUST BE A GOOD MIXER

In speaking of the relation of the representative of the claims department and the public, Mr. Boynton specified that the claims man must be both firm and reasonable. The type of people who are constantly trying to "put something over" on the electric railway must be taught that fraudulent claims will be contested from start to finish; but if a meritorious claim is presented it must be settled equitably, not only because this is right but because such action will improve the standing of the claims man and his employer in the community. It is important that a claims representative of a utility company affiliate himself with civic organizations and take an active part in their proceedings, thus making friends for himself and company.

The claims man, said Mr. Boynton, is naturally interested in the prevention of accidents, and he can, through continued effort, show the public that he is employed not only to save his company's money in the settlement of claims but to help to standardize safety methods that will result in saving of life, limb and property. The claims man must not confine himself to the prevention of accidents on the railway property, but must be broad enough to work along all safety lines.

Referring to the results of the safety efforts made in Portland, Mr. Boynton said that the educational work done in the schools has proved very effective and the public testified to the fact that this work was beneficial to the community as a whole. In Portland, also, the railway co-operated in fire prevention work, as a logical development of the safety effort. A fire prevention committee was organized, which in three years reduced the fire loss from $7.50 to $1 per capita.

Accident Prevention*

Safety Should Be Made Fundamental Part of Operation — Requires Carefully Planned Though Not Necessarily Expensive Organization

BY CHARLES B. SCOTT
General Manager Bureau of Safety, Chicago

IT SEEMS remarkable that any electric railway company should be skeptical, indifferent or inactive with reference to accident prevention. The safety work done by many industries, and particularly by the steam roads, has proved conclusively that a material reduction in accidents is possible and that the burden of accident costs can be made less. Why are not the electric railways as a whole awakened to the importance of the subject? Perhaps it is because of the error in which many companies have fallen of adopting plans which were not thorough. If the manager of any property believes that he can bring about safe operation of his property and co-operation from the public by any inexpensive and spectacular plan of publicity only he is doomed to disappointment. It is also a mistake to believe that the work of accident prevention can be delegated to some particular individual within the organization and that thereafter it need have no further thought by those in a supervisory capacity.

A great majority of those electric railway accidents for which the employees of the company are responsible are due to a laxity in enforcement of rules. There is an inclination upon the part of electric railway employees to supplant certain rules with habitual customs, and for this reason a frequent and careful check-up of dispatching systems, obedience to rules governing the trainmen and rules adopted by the mechanical departments is absolutely necessary. Until this has been done other usual efforts, such as enlisting the co-operation of the public, are of very little avail.

The successful road with respect to accident prevention is the road that makes safety fundamentally a definite, businesslike part of its operation and one that involves the attention of the executives, the supervisory force and the employees and public generally. Such a proper intermingling of safety with operation requires a carefully planned though not necessarily an expensive organization whose chief function must be an everlasting drive. Sporadic efforts are really harmful to the cause of safety, causing the employees and the public to lose faith in the efficacy of the safety movement.

The problem which usually discourages the management of a company from making any definite, systematic and sincere effort toward lowering accident costs by preventing the accidents is the supposed indifference of the public. This is another problem that is not so difficult of solution as is imagined, and the public utility interests should be the leaders in the safety movement in their respective localities. The necessary expense would be small in comparison with the cost of the preventable accidents caused by public negligence. I know of no better way in which to begin this work than to bring the subject to the attention of the public schools, and in such an effort the utilities will find a prompt and hearty spirit of co-operation from school officials, school teachers and school children.

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*Abstract of address presented at meeting of the Central Electric Railway Association, Indianapolis, Ind., Dec. 3, 1920.

Your present big problem in accident prevention is the automobile, but here again careful organizational plans are necessary and the support of the executive is most helpful. On one of the principal electric roads entering Chicago, a road passing through a thickly populated district and along and across a trunk highway with extraordinarily heavy vehicular traffic, automobile accidents have been reduced 60 per cent, or $50,000, a year in three years, with a 30 per cent increase of traffic. This saving is being maintained, but not without a continuous functioning of its safety organization and the continued interest of its chief executive.

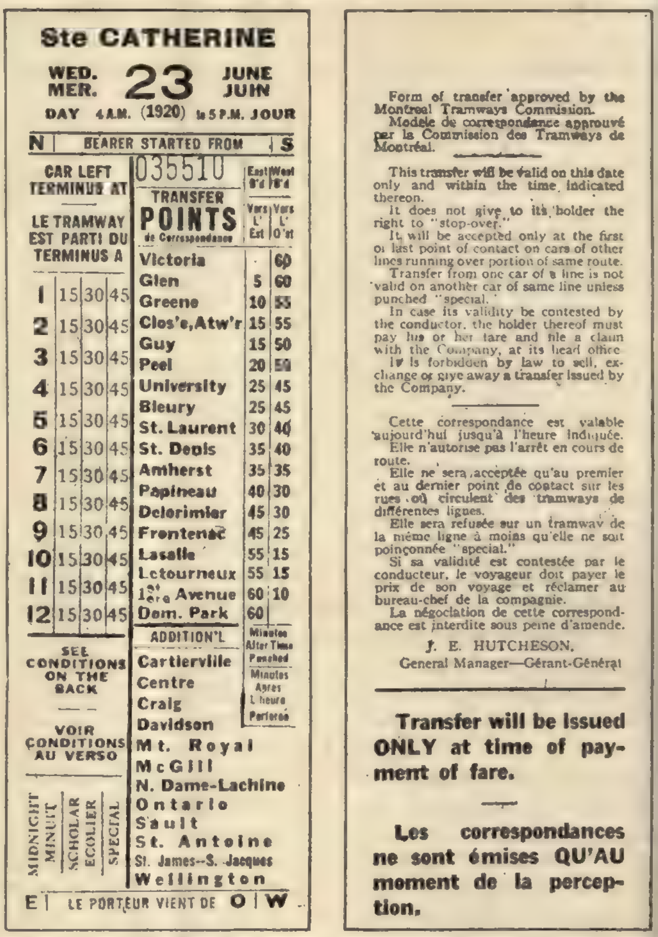
New Montreal Transfer

The Time of Leaving Terminus Is Punched and the Color Change Is at 5 p.m. Instead of at Noon

On Aug. 1 the Montreal Tramways Company put into use on all of its lines a form of transfer which had been on two months' trial on the Ste. Catherine Street line. This transfer contains a number of novel features, as will be seen from the accompanying reproduction.

One of these features is that the time punched is not the time at which the car reaches the transfer point, as on most transfers, but is the time at which the car left its terminus. Then, the time during which the transfer is valid is shown by the time punched plus the number of minutes printed on the front of the transfer opposite the name of each intersecting route. The principal advantage of this plan is that the time of departure and direction can be punched at each terminus, when the conductors have ample time to punch enough transfers for the half trip. On the trip, the conductor has to punch only the transfer point desired, so that the number of punches required during the trip is only one. If a passenger has to transfer twice, there is provision for it at the bottom of the transfer which contains under the words "additional" the names of all routes which do not directly connect with the line from which the transfer is issued.

The second distinguishing feature of the transfer is that different colors are used for day and night transfers rather than for a.m. and p.m. transfers. Thus, in Montreal a white transfer is good from 4 a.m. to 5 p.m., and a blue transfer from 4 p.m. to 4 a.m. This time also is indicated at the top of the transfer, the night transfer being similar to the day transfer shown except as to this line and as to color. An overlap of sixty minutes is allowed between 4 and 5 p.m., for the reason that conductors stop issuing white day transfers at 4 p.m. and sixty minutes is sufficient to permit passengers to make the full half trip on any of the lines in Montreal. The change is made at the close of the afternoon rather than in the middle of the day, because 5 p.m. marks the beginning of the rush hours, and it is less convenient for conductors during the rush hours to examine transfers for the time punched. Under the plan described they know at a glance by the color if the transfer is good.



Ste CATHERINE

WED. MER. **23** JUNE JUIN

DAY 4 A.M. (1920) to 5 P.M. JOUR

N | BEARER STARTED FROM | S

CAR LEFT TERMINUS AT

LE TRAMWAY EST PARTI DU TERMINUS A

1 15 30 45
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SEE CONDITIONS ON THE BACK

VOIR CONDITIONS AU VERSO

MIDNIGHT MINUIT | SCHOLAR ECOLIER | SPECIAL

035510

TRANSFER POINTS de Correspondance	East B'd Vers L'Est	West B'd Vers L'O'st
Victoria		60
Glen	5	60
Greene	10	55
Clos'e, Atw'r	15	55
Guy	15	50
Peel	20	50
University	25	45
Bleury	25	45
St. Laurent	30	40
St. Denis	35	40
Amherst	35	35
Papineau	40	30
Delorimier	45	30
Frontenac	45	25
Lasalle	55	15
Letourneux	55	15
1st 1ère Avenue	60	10
Dom. Park	60	

Minutes After Time Punched

Minutes Après L'heure Perforée

ADDITION'L

Cartierville
Centre
Craig
Davidson
Mt. Royal
McGill
N. Dame-Lachine
Ontario
Sault
St. Antoine
St. James—S. Jacques
Wellington

E | LE PORTEUR VIENT DE O | W

Form of transfer approved by the Montreal Tramways Commission.

Modele de correspondance approuvé par la Commission des Tramways de Montréal.

This transfer will be valid on this date only and within the time indicated thereon.

It does not give to its holder the right to "stop-over."

It will be accepted only at the first or last point of contact on cars of other lines running over portion of same route.

Transfer from one car of a line is not valid on another car of same line unless punched "special."

In case its validity be contested by the conductor, the holder thereof must pay his or her fare and file a claim with the Company, at its head office.

It is forbidden by law to sell, exchange or give away a transfer issued by the Company.

Cette correspondance est valable aujourd'hui jusqu'à l'heure indiquée.

Elle n'autorise pas l'arrêt en cours de route.

Elle ne sera acceptée qu'au premier et au dernier point de contact sur les rues où circulent des tramways de différentes lignes.

Elle sera refusée sur un tramway de la même ligne à moins qu'elle ne soit poinçonnée "special."

Si sa validité est contestée par le conducteur, le voyageur doit payer le prix de son voyage et réclamer au bureau-chef de la compagnie.

La négociation de cette correspondance est interdite sous peine d'amende.

J. E. HUTCHESON,
General Manager—Gérant-Général

Transfer will be issued ONLY at time of payment of fare.

Les correspondances ne sont émises QU'AU moment de la perception.

FRONT AND BACK OF MONTREAL TRANSFER, WHICH REQUIRES ONLY ONE PUNCH EN ROUTE

Provision has been made on the transfer for emergency use under the heading "special," which is used only in emergency. Thus, if a car is diverted from its route for a trip on account of blockade, fire or to make a special trip for some hurry-up traffic, the conductor is required to make two punch marks at the head of the transfer, which indicate that the car is off its route. If a conductor on the road accidentally runs out of transfers and has to obtain some of another line, the same procedure is followed.

There are also places to punch "after midnight" and "child," the latter being especially needed as school children travel at reduced fares and they number about 60,000 each day.

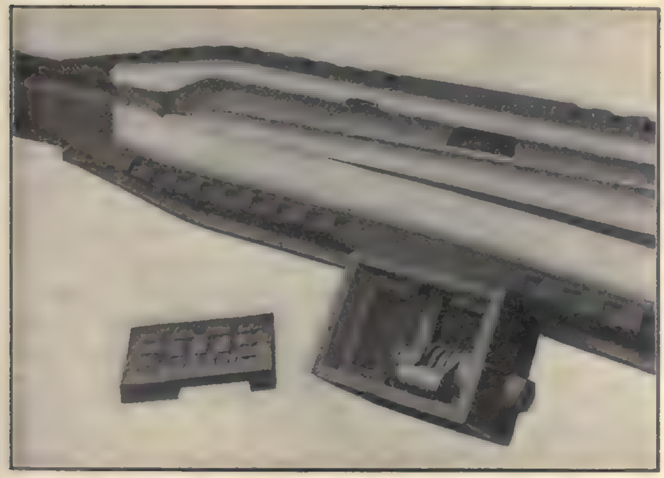
Another interesting feature of the transfer is that it is printed in both French and English, although in size it does not differ from most transfers in other cities, being 5¾ in. long and 2 in. wide.

In the transportation of freight, various plans have been set forth for the use of containers which can be loaded by the shipper and carried to their destination by means of one vehicle or another. One such system is that of the River & Rail Transportation Company of St. Louis, Mo., which uses a container of such size that five can be loaded on a specially designed flat car. These containers are suitable for transportation by truck, or they can be unloaded on the flat car through suitable openings on top or side.

Preventing Splitting of Switches

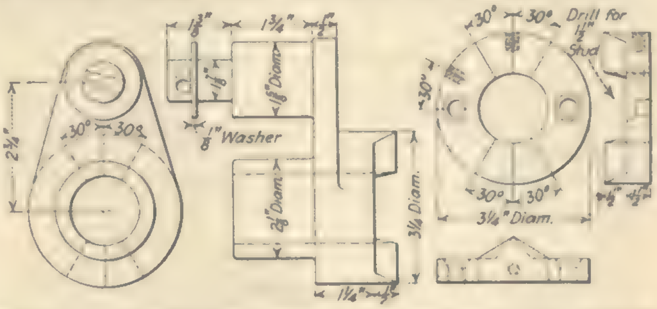
New Track Switch Automatic Locking Device Designed to Prevent Changing to Opposite or Neutral Position While Car Is Passing

THE splitting of switches by street cars may be overcome, it is claimed, by the use of an automatic locking device, attached to the switch tongue, which has been invented by A. Taurman, superintendent of equipment Birmingham (Ala.) Railway, Light & Power Company, and placed on the market by the Lorain Steel Company. The device, in general, comprises a two-way cam which works against a coil spring in a manner that holds the switch tongue firmly in either running position. A bell crank is mechanically connected to the switch tongue, so that a movement of the switch point in either direction is accompanied by a rotation of the crank. The outer face of this crank is made with a double 30-deg. cam, machined and casehardened, which works against the face of a corresponding cam fastened to the end of the steel containing box and supported by the crank stud. The rotation of the crank causes the cam to act. As the switch point moves to a central position the crank is shifted along its axis by action of the cam, compressing a heavy coil spring. The switch point thus resists being moved away from either running position. As the switch point is forced over beyond the central position the spring and cam act together to snap the switch point to the opposite running position. It is thus seen that the switch point is firmly held, virtually locked, in either running position, and that it cannot fly over to the opposite or to a neutral position while a car is passing over it. The position of the switch point can be changed only upon application of a substantial lateral force.



A NEW TRACK SWITCH LOCKING DEVICE

The amount of pressure exerted by the spring upon the cam is adjustable. Sufficient travel is provided on the cam to take up for wear in the mechanism and to hold the switch tongue firm and steady in either position. The cam faces are protected from grit and dirt by a shield mounted on the top of the cam block and extending out over the crank boss. All wearing parts of the mechanism are made of machined steel and hardened. The whole device is mounted in a standard Lorain Steel Company track box, which is securely bolted to the switch casting.



DETAIL DRAWING OF CRANK AND BOTTOM CAM, WHICH FORM THE MAIN PARTS OF THE LOCKING DEVICE

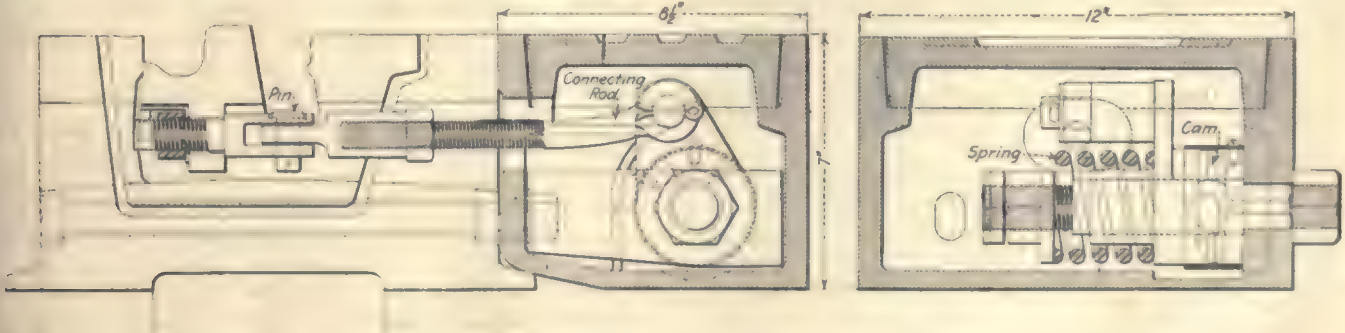
This Taurman track switch locking box is in use by the local companies in Richmond, Norfolk and Hampton, Va.; Cincinnati, Ohio; Covington, Ky., and Birmingham, Ala.

Twentieth Century Freight Haulage

AT A RECENT meeting of the Society of Terminal Engineers held in New York City Col. J. C. Bonner presented a paper under the title of "Twentieth Century Freight Haulage." The paper was principally a presentation of the rail wagon which was described in ELECTRIC RAILWAY JOURNAL Oct. 12, 1918, page 658.

The rail wagon was likened by Colonel Bonner to the English and French 3½ to 10-ton goods lorries. It is designed so that it can be drawn by a team of horses, or rest astride an auto chassis; again, two or three of these vans may be vestibuled snugly, end to end, astride a chassis trolley car or a similar freight car.

By the use of these containers or rail wagons it is claimed that much of the expense of terminal loading and unloading would be obviated. Another advantage is that this is a practicable means for utilizing electric railway trackage at idle or off-peak hours. Colonel Bonner estimates a saving of 50 per cent of the present cost and time of transportation where freight rehandling in transit is required.

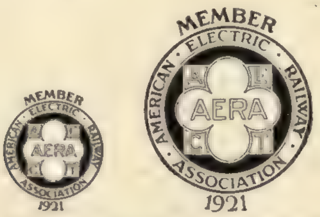


TWO CROSS-SECTIONAL VIEWS OF TRACK SWITCH LOCKING DEVICE

Association News

Emblem Cuts Ready

SECRETARY BURRITT has sent a notice to manufacturer members of the association, calling attention to availability of the cuts recommended by the 1919-1920 committee on company membership for use on members' printed matter.



EMBLEM FOR USE ON MEMBERS' PRINTED MATTER

The cuts are available in the sizes shown in the accompanying illustrations. To illustrate the use of the emblem in a practical way it has been incorporated in the layout of the "Contents" page, the one facing the inside front cover, in this issue of the JOURNAL.

Recommendations on Mail Pay

A MEETING of the committee on mail pay of the American Electric Railway Association was held in New York on Dec. 9. Those in attendance were L. H. Palmer, chairman; Charles L. Henry, W. S. Rodger, G. K. Jeffries.

As a result of the meeting the committee will make two recommendations to the executive committee. One is that the association should ask the commission for permission to reargue the case on the failure of the commission to award the increase of pay for the transportation of mails from the date of the passage of the act in 1918.

The other recommendation of the committee was that the electric railways urge the commission to make a readjustment and increase in mail pay rates on June 6, 1921, the date upon which the next mail pay period begins.

Connecticut Company Section Elects Officers

AT THE monthly and annual meeting of Company Section No. 7, held at New Haven on Dec. 2, F. P. Harlan, manager New Haven division, was elected president, while V. S. Curtis, secretary and general traffic agent of the company, was re-elected vice-president. C. K. Savery, secretary, and George H. Crosson, treasurer, were re-elected, and J. M. Hamilton was re-elected director for three years.

The first speaker was L. S. Storrs, president of the company, who gave a frank talk concerning company matters, past, present and future, including reference to the jitney situation and to the company's financial condition. He gave an opportunity for the asking of questions and the meeting developed into an informal one. J. K. Punderford, vice-president and general manager, was the next speaker. He congratulated the men on the work done in keeping the lines open during the winter of 1919-1920, which he stated had been the most severe in his railway career of twenty-eight years.

In addition to the speaking there were several good musical numbers. The meeting was preceded by the usual dinner.

Coming Committee Meetings

Meetings of the executive committee of the Committee of One Hundred and the publicity committee of the American Association are scheduled for Dec. 15 in New York.

Letter to the Editors

The Limit to Riding in Large Cities

84 PINE STREET
NEW YORK, Dec. 1, 1920.

To the Editors:

The paper by H. M. Brinckerhoff at the recent A. S. C. E. section meeting and the resulting discussion raise the important questions "How big is New York City going to grow?" and "How far in the future can further transportation economically be planned?"

Regarding the first question, Mr. Brinckerhoff goes no further than to say that this future growth must have some limits. Mr. Turner, on the other hand, estimates the urban traffic of New York in 1945 at 5,000,000,000 passengers and says that in seventy-five years the traffic may amount to somewhere around 9,000,000,000. The writer proposes to show briefly what the traffic figures predicted by Mr. Turner really mean.

It is well known by students of urban transportation that the Mattersdorff rule, that traffic will increase in the ratio of the square of the population increase, can be confidently applied within certain limits only, and where the number of "rides per capita" approaches 400, the rate of traffic increase will approximate the rate of population increase. This statement can be proved by the following consideration:

The average American family in large cities consists of five members, three of whom are, as a rule, engaged in useful occupation. Of these three, two may be assumed to ride and one to walk to and from his place of employment. In very large cities, where ample and rapid transportation is available, the proportion of walkers is reduced. The 1916 canvass in Chicago showed about 25 per cent walkers. No actual data are available for the habits of New York workers, but the writer believes that the proportion of walkers is not and will not be less than 20 per cent. The number of habitual rides per annum for a family of five would therefore be, making the customary assumption of 330 riding days,

$$330 \times 2 \times 0.8 \times 3 = 1{,}584 \text{ rides per annum.}$$

Four rides per week for the two other members of the family, a liberal assumption, gives 416 rides per year. A yearly total of 2,000 rides results for a family of five—in other words, 400 rides per capita.

Of course, in a large city the daily influx of suburban residents and the transient population will increase the total number of rides and consequently the number of rides per capita of resident population. Based on present Greater New York statistics (as far as they are available) this increase amounts to about 10 per cent, so that a figure of 450 rides per capita of resident population is probably the maximum which can ever be expected. On this basis, Mr. Turner's traffic prediction of 9,000,000,000 passengers means that he expects a population of 20,000,000 within the boundaries of corporate New York seventy-five years hence, and a population of more than 11,000,000 in 1945.

In the writer's opinion it is altogether unwarranted to assume that Greater New York ever will reach a population of 20,000,000 people. It seems certain that the housing and feeding of, and the supplying of such utilities as paving, sewerage, water, light and power to, this tremendous hypothetical aggregation of humanity cannot be accomplished without increasing the living cost (through taxes, distributing expenses and middlemen's profits) far beyond the figure which the people would be willing to pay for the comforts and attractions offered by the metropolis. There is no doubt that the increase of the cost of living will be one of the principal agencies which will stop the further growth and eventually cause a decrease of the city's population. The result of the last census is indicative in this respect. It not only shows a decreasing rate of population increase, but actually a decreasing numerical increase, suggesting the thought that the saturation point of Greater New York cannot be very far in the future.

Another element which should receive careful consideration in this connection is the fact that the Atlantic Ocean is evidently beginning to lose its overwhelming importance as the highway of international commerce. Broadminded manufacturers, business men and well-informed bankers seem to be of the opinion that Europe, as a consequence of the war, has fallen into another period of decadence and they turn their eyes toward the Far East as the future market of American products. The unprecedented increase of the population of certain Western cities, especially that of Los Angeles and San Francisco, should not be overlooked.

Finally, the writer believes that should the next decade indicate a growth of the city toward the figures predicted, or implied, by Mr. Turner, the safety of the residents would require action to stop this growth by economic pressure. There would be no way to prevent, for instance, famine, due to accidental breakdown of transportation facilities, should the city grow to 20,000,000 people living on an area of less than 300 square miles. At the present time already continued bad weather is almost catastrophic to the welfare of New Yorkers. Imagine now the plight of four times as many people dependent on food, every ounce of which must be imported, should floods or snow or ice demolish or damage all or even only some of the avenues of incoming supplies. Furthermore, from a strategic point of view, it would be almost criminal to permit the aggregation of perhaps 12 or 13 per cent of the country's population and possibly 50 per cent of the nation's wealth in a location exposed to enemy attack. The writer cannot conceive of the possibility of supplying the necessities of life to a New York of 20,000,000 people under conditions which may arise should the country be forced to carry on a defensive warfare.

All of the foregoing arguments, in the writer's opinion, point toward the necessity of applying extreme conservatism in predicting the future growth of New York City. He believes that a damper should be placed upon the fantastic figures appearing in papers dealing with the city's transportation problem, at least when this problem is seriously considered by a scientific body. The conditions are such that predictions made beyond a very few, say five or six, years have little, if any, value.

Regarding the second question: "How far in the future can transportation in New York be economically planned?" It follows from what has been said that it would be unwise, at the present time, to consider any radical extension of the city's rapid transit lines. The efforts of the competent authorities should rather be turned toward righting the mistakes made in the planning and in the make-up of the present facilities.

Mr. Turner states that the present rapid transit mileage has an estimated capacity of 3,000,000,000 passengers. It is fair to assume that when this capacity is reached, the surface lines and buses will still carry one-third of the city passengers—in other words, the total number of passengers will be about 4,500,000,000. Based on the limiting number of rides per capita as determined above, the population necessary to produce this figure is 10,000,000, which is probably very near, and possibly above, the magnitude that the city will ever reach. It appears, therefore, that all that should be done is to make such changes in both the layout and the operating methods of the present lines as would enable the use of the present trackage to the best advantage.

For this purpose the actual movement of the passengers should be accurately determined. It seems unbelievable, but nevertheless a fact, that no dependable traffic check has ever been made in New York City. The Public Service Commission in analyzing the traffic characteristics of the rapid transit lines bases its figures on the flimsy information furnished by station ticket sales, while there are practically no data by which such important factors as the length of haul or the density of traffic on different sections of the several routes could be determined for the surface lines. It is no wonder that the "dual system" operated at present appears to be already saturated, as it was planned without the knowledge of fundamental conditions. This mistake should be avoided in the future and no further planning done unless reliable data are made available through a thorough traffic count and other studies fundamentally pertinent to the traffic problem.

After the passenger movement throughout the city is so determined it should be comparatively easy to make physical plans for necessary changes in the present layout and equipment and possibly for some unavoidable extensions of the lines of both rapid transit and surface systems.

At the same time, the legal and financial questions included in the unification of all transit lines should be carefully studied and a plan devised by which a new period in the history of the city's transportation could start, based on the principle of: "One transit system and one fare for Greater New York." E. E. HALMOS.

The Bureau of Standards has recently issued a circular letter describing the properties found from tests made on proprietary light aluminum alloys. The conclusions reached are that the claims for superiority of these light alloys over standard alloys are not fulfilled. Many of the compositions tested were not new because their properties had been recorded many years ago during systematic investigation. The available standard alloys have well-defined properties superior to those of all present competitors.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Construction Progressing

Municipal Road at Detroit Suspends Evacuating Work for Winter—Continues Overhead Construction

In order that traffic can be resumed on streets which have been closed because of construction work on the municipal railway lines at Detroit, Mich., excavation work on the streets along which new lines are being built has been suspended by the city for the winter.

STEEL TIE CONSTRUCTION ON THE ST. JEAN LINE SOUTH FROM WARREN AVENUE, OCT. 22

The work of the municipal railway is being done by the city of Detroit, Department of Street Railways, James Couzens, Mayor, under a Board of Street Railway Commissioners consisting of Ralph B. Wilkinson, chairman; William B. Mayo and G. Ogden Ellis. The general manager of the system is Joseph S. Goodwin. Other officers are: William C. Markham, construction engineer; A. C. Colby, superintendent of equipment; W. D. Edgecomb, engineer of maintenance and way; H. M. Gould, electrical engineer; I. N. Merritt, accountant; H. P. Hevenor, consulting engineer; C. J. Conway, superintendent of tracks; E. M. Booth, superintendent overhead lines, and H. B. Stowe, chief draftsman.

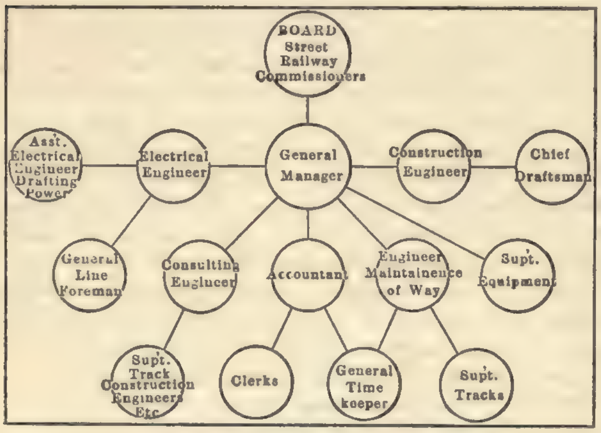


CHART OF ORGANIZATION OF DETROIT MUNICIPAL RAILWAY

According to the report of the general manager for the week ended Nov. 27, 49,053 linear feet of concrete base has been completed—all of which is for double track except the 3,610 ft. of single track road bed on Harper Avenue. Double track in place to gage amounted to 39,490 linear feet. The 3,610 feet of single track on Harper Avenue has also been placed to gage.

Of the total amount of track laid, 23,429 linear feet of double track and 2,610 feet of single track has been finished and paved in.

Twenty-five cars have been ordered and are being built according to the specifications furnished by the municipal street railway officials. Arrangements have already been made with the Detroit Edison Company to furnish energy.

POURING CONCRETE ON CHARLEVOIX AVENUE EAST OF SEYBURN AVENUE

Work is progessing on the overhead line, all the equipment and material having been purchased except the trolley wire. Bids are to be opened soon by the city purchasing department for 30 miles of cold drawn copper wire. Poles are set on the Shoemaker section of the St. Jean line.

Semi-Annual Safety Banquet

Successful Gathering of Union Traction Company Employees at Anderson on Dec. 3

The 100 members of the safety organization of the Union Traction Company of Indiana gathered for their regular semi-annual safety banquet in Anderson on the evening of Dec. 3. H. A. Nichol, general manager of the company and general chairman of the safety organization, acted as toastmaster, as is the custom. Dinner was prepared by C. S. Keever, superintendent of transportation. After dinner there were songs and other entertainment and speeches on safety. A local orchestra, a soloist and a reader from the company's own organization livened the interest in the meeting. The reader was Mr. Patton, who was introduced as a life-long personal friend of James Whitcomb Riley. His reading of two of Riley's best poems brought him an ovation. Other members of the company organization who addressed the meeting were H. A. Nichol, J. A. Van Osdol, general attorney; Arthur W. Brady, president; James Hesler, chairman of the shop safety committee, and R. E. Luellen, safety engineer.

For the first time at these banquets outside guests were placed on the program. The principal speaker was Edward C. Spring, general superintendent of the Lehigh Valley Transit Company, Allentown, Pa., whose highly successful and extensive safety work with his own company enabled him to make a very interesting and inspiring talk. The other outside guest on the program was H. L. Brown, Western editor of the ELECTRIC RAILWAY JOURNAL.

The spirit of enthusiasm for the safety work of the company displayed at this banquet was noteworthy. These banquets have become an institution with the Union Traction Company and new members elected to the safety organization each year look forward with great interest to this event. The dinner, the speeches about safety and the entertainment produce enthusiasm for the work that may explain in a measure the reason for the winning of the Brady safety award by the Union Traction Company on two occasions, and for the apparent continuing success of the safety work of this company.

Railway Wins Tilt With City

Davenport Officials Blocked in Attempt to Prevent Service Curtailment—Court Enjoins City's "Strong-Arm" Methods

In the face of unabated opposition on the part of the city authorities of Davenport, Iowa, the Tri-City Railway has instituted a program of financial retrenchment as a means of putting its Davenport lines on a partially paying basis. Service has been curtailed by the cutting off of one line, the shortening of others and the stopping of "owl" cars at midnight. The company has secured from Judge A. P. Barker an injunction restraining the present administration of Davenport from employing "strong-arm" methods to force the railway to abide by the provisions of its franchise. The court action has brought about a cessation of open hostilities between the city and the railway pending an appraisal of the company's property.

THE battle between the city and the railway was precipitated when the company, which has operated at a loss for many months, discontinued service on the Fourth Street line and cut off the "owl" cars at midnight. This action occurred Dec. 1. The City Council had previously turned down the company's plea for an experimental operation of one-man cars as a means of reducing cost of operation and giving better service.

COMPANY FACING BANKRUPTCY

The railway did not take the action in cutting service until a conference was held with the city officials to bring out the fact that the company was facing bankruptcy. The company asked for relief through the elimination of non-paying lines. This conference secured no unbending on the part of the City Fathers, who stated that they would enforce the old franchise to the letter.

The fare in Davenport is now 9 cents, with free transfers, as fixed by a court injunction several weeks ago. The rate was raised to 9 cents from 7 cents, a fare also made through injunction. The franchise rate is 5 cents. The party now in control of the city government won its offices at last spring's election largely on the promise that if elected it would reduce the fare to the old 5-cent base specified by the existing franchise.

It is improbable that the audit and appraisal of the traction lines for which the city is paying $25,000 will be in the hands of the authorities before Jan. 1.

Following the cut in service City Attorney U. A. Screechfield, representing the majority members in the City Council, immediately filed warrants for the arrest of President B. J. Denman, Vice-President J. G. Huntoon, Assistant General Manager T. C. Roderick and ten trainmen.

A PLAY TO THE GALLERIES

The warrants were served by the city police with all of the demonstration which might accompany the seizing of noted criminals. With bells jangling the patrol wagon was driven to the general offices of the traction company, the officials were taken into custody by policemen and the patrol was then driven through the downtown streets before the traction officials were taken to the station house.

Arriving at the police station the officials were taken before the police magistrate, who imposed a fine of $100 each on five counts. Two trainmen were fined $25 each. Appeal bonds for the three officials were fixed at $1,000 each and were posted after notice of appeal to the District Court was filed.

Messrs. Huntoon and Roderick were arrested twice and the arrests threatened to become a daily occurrence until Judge Barker of the United States District Court intervened by signing a temporary injunction restraining the city authorities from a continued attempt to enforce the old franchise requirements through the medium of the strong arm of the law. The traction company then shortened the Bridge line loop by several blocks, cutting out much dead territory, and put into effect the full retrenchment program previously announced.

Judge C. M. Waterman, dean of the Davenport bar, severely criticised the action of the city authorities in making the arrests, saying that the use of the patrol wagon was "calculated to humiliate and disgrace" the officials of the traction lines. The latter bore the action with good grace. As a means of preventing the curtailment of service the city's course proved a dismal failure.

Local newspapers also roundly scored the city's tactics in their editorial columns.

Monorail Seeks Rights in Michigan

Requests have been made by the Michigan Elevated Railway for permission from the State Public Utilities Commission to do business in Michigan. The company proposes to construct an experimental monorail elevated electric line in or near Detroit. Under the plan outlined by the incorporators, the general public would be solicited to pay the cost of an experimental line, to be constructed on Woodward Avenue between Detroit and Royal Oak or on some street designated by the City Council. This would ultimately become a part of an elevated system running from the center of the city to the northern suburbs.

Pedestals supporting the monorail would be placed from 40 to 60 ft. apart and based where the present curb line runs. Coaches would run on a single I-beam rail on top of the pedestals, 14 ft. above the curb. Another I-beam would be held above the coach and guide wheels on the top of the coach would be closely fitted into this rail to assure stability and keep the coach from tipping to one side. The number of cars included in a train could be varied to meet the demands of traffic. The cars would be of modern fireproof construction. They would weigh approximately 80,000 lb. each. The trucks would be made to follow the rails by means of guide wheels which make it impossible for a car to leave the rail. The brakes would be made to operate directly on the lower rail, relieving friction from the driving wheels. A composition rim made practical because of the width of the rail on which the drive wheels run would permit the cars to operate almost noiselessly.

New Depots and Yards Planned for Hollywood

Final steps toward the establishment of a new freight station and yards for the Hollywood district of Los Angeles have been announced by the Pacific Electric Railway. The company has completed arrangements to file with the California State Railroad Commission applications for the vacation of its present station facilities at Hollywood and Cahuenga Boulevards, while a new freight station, with adequate trackage to serve same, will be erected and constructed at a relocated site in the Hollywood district known as Santa Monica Boulevard and Highland Avenue.

It is planned to have the new station facilities ready for service shortly after the first of the year, and construction work will be undertaken as soon as the approval of the railroad commission has been received. The new site provides a greatly enlarged area over the present facilities, and the acquisition of additional ground will permit the company to provide a layout that will meet the needs of the community.

The tract of ground is just beyond the city limits of Los Angeles and in a district in which a number of important industries have recently located. For the location of the depot and trackage to be constructed a portion of the tract needed requires a 285-ft. frontage on Santa Monica Boulevard and extending to a depth of 340 ft. The estimated cost of the removal of the old layout and construction of new depot and trackage is $20,000, exclusive of the cost of acquiring the new site.

Vacating of the present freight depot site will serve to make the property available for a further building up of the business section of Hollywood, which has rapidly developed around the old station during the past eight years. It was because of this rapid growth of business that the company saw fit to seek an enlarged site that would permit of development as a freight depot without encroaching upon the natural development of the business center of the town.

State Commission Reports

Connecticut Body Says Electric Railways Are in Bad Way Financially —Appraisal Being Completed

The State Public Utilities Commission of Connecticut, in its ninth annual report, issued on Dec. 5 at Hartford, declared that the electric railways of the State were in a bad way financially and that they had not been kept up to the standard of previous years. The commission says:

> During the present calendar year the commission will have made a physical valuation of most of the electric railways of Connecticut. We did not have the money nor the employees to make a minute appraisal such as would have been made at an expense of approximately $100,000 by an expert appraisal company, but we believe the result obtained by the commission's valuation will be equally satisfactory and reliable and in the final analysis check up closely with a detailed scientific appraisal.

CONNECTICUT COMPANY EARNED $11,043,804

The following statistics were given out concerning the twelve electric railways operated in the State for the fiscal year just closed:

The total balance on Dec. 31, 1919, was $1,299,889, a decrease of $844,595. The aggregate assets in 1919 were $107,879,988, a slight increase over the previous year. An increase of $875,667 in operating revenue was more than offset by an increase of $1,047,433 in operating expenses, the net revenue being decreased $171,766. The net revenue from the transportation of passengers totaled $948,775.

Figures for the Connecticut Company show that, up to the time that the zone system went into effect on Nov. 2, 1919, the road carried 143,934,704 passengers at an average fare of a little less than 5 cents, because of free transfers. Between Nov. 2 and Dec. 31, 1919, 22,632,171 passengers were carried at an average fare of about 7 cents.

The total operating revenue of the Connecticut Company for the year ended Dec. 31, 1919, was $11,043,804, of which $10,908,328 was from transportation, while $135,476 was revenue from other railway operations. The increase over revenue of the previous year was $1,108,054. Railway operating expenses amounted to $9,210,376, an increase of $1,059,942 over the previous year. The net revenue from railway operations was, therefore, $1,833,428, an increase in net operating revenue of $48,111. Taxes amounted to $619,657, making the net operating income $1,213,770 and with non-operating income the gross income was $1,446,601.

$53,046,568 IN PERMANENT INVESTMENT

The Connecticut Company had a liability to the Connecticut Railway & Lighting Company on Dec. 31, 1919, amounting to $625,287. Its floating indebtedness, represented by demand and short term notes, is $3,130,313, of which amount $3,071,038 was due the New York, New Haven & Hartford Railroad and $59,305 to the Wason Manufacturing Company.

An amount in excess of $400,000 was expended by the Connecticut Company last year on its plant, according to the report. Of this sum, $162,242 was for road and equipment and $241,479 for improvements, additions and betterments.

The total permanent investment of the company is $53,046,568.

Buffalo Railway Demurs

Says Wage Increase Should Not Be Retroactive and Must Be Contingent Upon Fare Advance

Efforts are being made to break the deadlock existing in the wage controversy between the International Railway, Buffalo, N. Y., and its union employees. The latest hitch in the arbitration proceedings came at a meeting of the board in New York City. At that time the company demanded that the arbitration proceed only upon the condition that any further wage increase shall be made effective only from the date that a further increase in fare is allowed. This stipulation was added in order to make the payment of such increased wage possible.

James A. Vahey, general counsel for the Amalgamated Association, who represents the platform men on the board, objected to proceeding under this stipulation and the meeting was adjourned. Since then sessions have been held in Buffalo at the call of Charlton Ogburn, New York, the third member of the board.

MR. JOYCE STATES COMPANY'S ATTITUDE

In a letter to Mr. Ogburn written by C. J. Joyce, counsel for the Mitten interests and representative of the International Railway on the board, Mr. Joyce declares that he sees no good purpose to be accomplished by a meeting of the arbitrators until "we are sufficiently agreed to permit us to proceed with the actual work of arbitrating the question submitted."

Mr. Joyce reviews the disruption of negotiations which followed his presentation of Herbert G. Tulley's letter as president of the railway setting forth the company's insistence upon a fare increase as preliminary to wage increases.

The board was told by Mr. Joyce at its session in Buffalo that Buffalo cannot fairly be expected to pay increased wages at Niagara Falls, Lockport or on the interurban lines and that consequently if a general increase in wages were ordered by the arbitration board, the actual payment of these wages in each of the four separate divisions must await the collection of a fare in each separate location sufficient to meet the increased wages ordered.

Seattle Investigation Continued

The grand jury at Seattle, Wash., reported to have been investigating the city's purchase of the Stone & Webster traction lines for $15,000,000, has been recessed until Jan. 17, when, if Mayor Hugh M. Caldwell is prepared to continue the inquiry, it will resume its investigations. No indictments were returned with the grand jury's report, nor was there any indication in the statement in regard to progress made.

The grand jury report says that in view of public dissatisfaction with the purchase of the lines, the jury "considered it its duty to tender to the Mayor of the city of Seattle its services and powers, so that he would have the benefit of its inquisitorial functions in the discovery of any facts that he desired to obtain."

The report sets forth that Mayor Caldwell requested the grand jury to adjourn its sessions until January, 1921, when, he has said, he expects to have ready for report to the Council the results of the investigation of the railway purchase which he is conducting in accordance with the resolution of the City Council.

Two Railway Employees Win Courtesy Prizes

The Chicago *Tribune* is carrying on a courtesy contest by sending out a reporter in search every day of the most courteous and polite person he can find, this person being awarded a $50 prize as the result. A Chicago Surface Lines conductor and a switch tender have been the recipients on two different days of the $50 prize.

Conductor John Lynch won the prize because he honored a transfer which was not good according to a strict interpretation of the company rules, but chose to accommodate the passenger and win a friend for the company rather than to refuse the passenger the privilege for the few blocks he intended to ride. Later, in explaining his attitude, the conductor said that he always hoped to be polite, though with the crowded condition of cars it was a hard job. "But I try to treat them right, you know," he said. "So many people get confused on this transfer business —there are so many different rules and regulations, but I size the man up. If he looks honest and his intentions seem good I usually give him the benefit of the doubt. Sometimes I have to throw the dead beats off—I can usually tell them from the others."

The switch tender who won the $50 prize was Thomas Heffernan, whose position of employment is in the Loop District at the corner of Dearborn and Randolph Streets. In this case the reporter noticed that this man was constantly being asked for directions about the city. The reporter approached him and asked, "Where am I?" The switchman answered him and asked him where he wanted to go. The reporter answered, "The railroad station." In return he was asked "Which one?" The reporter didn't know, and the switchman finally dragged out of him that he wanted to go to Milwaukee, and then explained in detail how to get to the proper station. To make his questioning more unbearable the reporter asked for a piece of paper on which to write down the directions. The switchman's temper was not ruffled, however, and he won the prize.

New Attitude Suggested

Commission's Letter to Governor Tells of Effect of Rising Costs on Electric Carriers

The interurban and street railways have suffered more, perhaps, than any other class of utilities from the conditions brought about by steadily rising costs during the last few years, says the California Railroad Commission in its report to Governor William D. Stephens for the year ended June 30, 1920. With fares fixed at 5 cents, by custom and by franchise, the shrinking value of the dollar threatened disastrous consequences for practically all street railways. The report says:

> And yet it is apparent that, in spite of the more severe competition of motor vehicles, the time is by no means here when our cities and rural territories can dispense with electric railway facilities The automobile stage, the jitney and the privately-owned automobile are not a substitute for the city railway or the electric interurban railway. In the few places in the United States where this belief was prevalent, the consequences have shown its fallacy.

The commission says it has not hesitated to extend to the electric railway systems of the State such relief, by increase of fares or by establishment of the zone system, or by ordering radical operating economies, as would insure a continuation of reasonably good service. Continuing it says:

> The commission has also taken opportunity to call attention to its belief that the relationship between street railway and the communities they serve should be radically changed and that a modification of obsolete franchise requirements would distinctly be in the interest of the public. No sound reason exists any longer, for instance, why the street car user should bear the total burden of the cost of paving a portion of the most expensive city streets, when in adjoining city streets, which do not have the advantage of street railway service, this same burden is borne entirely by the adjoining property owners. The change from unsatisfactory and obsolete term franchises to better indeterminate franchises is now being effected in several communities and is being given careful consideration in others. The commission, under the public utilities act, is called upon to take part in the creation of better franchise conditions and several proceedings of this nature are now pending.

Trustees Seek to Spend $4,421,000

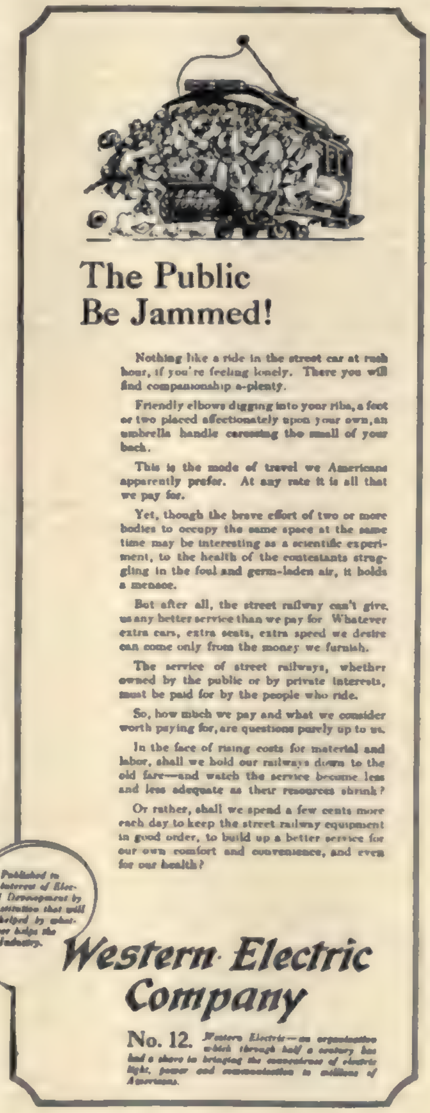
The trustees of the Boston (Mass.) Elevated Railway have asked the Legislature for authority to spend $4,421,000 for the erection of new repair shops, the building of a new powerhouse, the establishment of storage yards and the general improvement of the service.

The recommendations of the trustees are embodied in a petition filed with the Secretary of State, which says that "proper operation of a street railway calls for sufficient cars to carry passengers in reasonable comfort, and for shop facilities to keep those cars in repair." Continuing, the trustees declare that some of the present facilities of the Elevated are wasteful and inefficient, and must be improved in order to eliminate delays which may result in inconvenience to thousands of passengers at a time.

They ask for authority to spend $3,000,000 for new repair shops at the Everett terminal, $1,421,000 for increasing the power facilities, and an unestimated amount for a storage yard at Forest Hills. They also reiterate the request made in their first annual report a year ago that the State be empowered to buy bonds to be issued for service improvements.

Railway Problem Advertised in National Medium

The Western Electric Company, in the interest of electrical development and achievement, published the accompanying advertisement in a recent issue of the *Literary Digest.* The occasional rider and even the regular rider on an electric railway is transported from one place to another in sublime ignorance of just what that one trip has cost the owner of the property. As the Western Electric Company indicates, the problem for the public to decide is whether in the face of rising costs it shall hold the railways down to the old fare and watch the service become less and less adequate or whether riders will spend a few cents more each day to keep equipment in good order so that service may be bettered for their comfort.



The Public Be Jammed!

Nothing like a ride in the street car at rush hour, if you're feeling lonely. There you will find companionship a-plenty.

Friendly elbows digging into your ribs, a foot or two placed affectionately upon your own, an umbrella handle caressing the small of your back.

This is the mode of travel we Americans apparently prefer. At any rate it is all that we pay for.

Yet, though the brave effort of two or more bodies to occupy the same space at the same time may be interesting as a scientific experiment, to the health of the contestants struggling in the foul and germ-laden air, it holds a menace.

But after all, the street railway can't give us any better service than we pay for Whatever extra cars, extra seats, extra speed we desire can come only from the money we furnish.

The service of street railways, whether owned by the public or by private interests, must be paid for by the people who ride.

So, how much we pay and what we consider worth paying for, are questions purely up to us.

In the face of rising costs for material and labor, shall we hold our railways down to the old fare—and watch the service become less and less adequate as their resources shrink?

Or rather, shall we spend a few cents more each day to keep the street railway equipment in good order, to build up a better service for our own comfort and convenience, and even for our health?

Published in the interest of Electrical Development by an Institution that will be helped by whatever helps the Industry.

Western Electric Company

No. 12. *Western Electric—an organization which through half a century has had a share in bringing the convenience of electric light, power and communication to millions of Americans.*

A MAGAZINE AD IN THE INTEREST OF FAIR PLAY

Sectional Body Suggested

Commissioners of Intermountain States May Arrange to Consider Problems Common to All of Them

Members of the Public Utilties Commissions of Utah, Nevada, Montana and Idaho have concluded a conference at the State Capitol in Salt Lake with a general discussion of problems common to all. The matter of express rates, which was one of the reasons for the calling of the conference, was left to the individual commissions to decide, in the light of what had been brought out by the discussions at the conference.

The commissioners found, however, that the exchange of ideas and general discussions at the present conference had been so helpful and beneficial that the proposition of forming a sort of intermountain association of utilities commissioners was very much in favor. It was pointed out that problems common to all the intermountain country might be discussed at meetings of such an organization, and it was indicated that some sort of a sectional meeting might be held with a view to uniform presentation of views to the National Association of Railroad & Utilities Commissioners.

In the absence of other members of the visiting commissions no action could be taken. It was left with Judge Joshua Greenwood, president of the Utah Commission, to correspond with other commissions to ascertain if some sort of an association of the kind suggested would be agreeable to all.

The visiting commissioners and the Utah commissioners were guests of the Mountain States Telephone & Telegraph Company at luncheon at its cafeteria. After lunch the officials were taken through the plant and the details of traffic and operation were explained. Later some of the visitors inspected the plant of the Utah Copper Company at Bingham.

Financing Interurban Found Difficult

Difficulties are being met in arranging for the financing of the Wichita Falls-Dallas Interurban line. There is talk to the effect that the project may not be carried through at this time. The Dallas (Tex.) Railways is committed to build the road in substitution for two lines each at least 30 miles in length as provided in the franchise granted to that company in 1917.

Under the contract entered into last spring Dallas and Wichita Falls raised $1,500,000 of the $7,500,000 needed to build the line. George Bishop, Cleveland, Ohio, agreed to dispose of the $5,000,000 of first mortgage bonds of the company. The first agreement called for the disposal of these bonds by Oct. 15, but this was later extended to Nov. 25. Another extension will be granted.

J. F. Strickland, president of the Dallas Railways, is of the opinion that the line can be built with less than the estimated $7,500,000, as materials used in railway construction and the cost of labor are on the decline. Mr. Strickland says he believes the line can be financed on $4,000,000 of first mortgage bonds and expresses a willingness to go ahead on that basis.

Mr. Bishop reported that he had disposed of $3,500,000 of the $5,000,000 first mortgage bonds by Oct. 1. It is believed that another $500,000 at least can be placed.

The committee had until Dec. 1 to notify the city of Dallas of success or failure of efforts to dispose of the securities and complete details for financing the project.

Kansas Industrial Court and Commission Functions to Be Separated

Governor Allen will ask the Kansas Legislature to separate the Industrial Court from the Public Utilities Commission. The plan suggested is to unite all the labor boards and industrial commissions of the state under the supervision of the Industrial Court and to restore the Public Utilities Commission for the administration of questions affecting the public utilities.

The Public Utilities Commission never has been able to keep up with its work even without the added duties of the Industrial Court. The commission is far behind now in its work as a public utilities commission, and because of that much important work of the body functioning as an industrial commission has suffered neglect during the past year. The court has been able to demonstrate the principle involved in the law and to show that such a court is entirely feasible, but it has only had time to establish the work of the Industrial Commission.

Paving a Burden in San Diego

The fate of the San Diego (Cal.) Electric Railway is in the hands of the people themselves, whose co-operation and support are prerequisites for the maintenance of service in that city. This is the point of view of William Clayton, vice-president and managing director of the company, who discussed the solution of San Diego's transportation problem on Nov. 15 before representatives of various business and civic bodies. He said that the automobile was in a great measure responsible for the poor financial showing of the company. The possibility of the company spending $1,000,000 on paving requirements was absolutely out of the question. Mr. Clayton further stated that paving obligations should be excluded from charter statutes by an act of the Legislature and that the Railroad Commission of California, with its comprehensive knowledge of public utilities, should review the paving question and other franchise burdens which the company must bear. He thought that abutting property owners and the city should bear the paving charges. In the final analysis the question was one for the people to decide. Without the support of the people San Diego was likely to find itself without electric railway service.

News Notes

Seven-Cent Raise for Fitchburg Men.—The Fitchburg & Leominster Street Railway, Fitchburg, Mass., has increased the wages of its employees to a maximum of 64 cents an hour. The new scale represents an increase of 7 cents an hour over the former rate.

Ottawa Will Vote on Railway Purchase.—The City Council of Ottawa, Ont., has decided to apply to the Provincial Government for power to borrow the necessary money to purchase the Ottawa Electric Railway should the ratepayers approve of its purchase by plebiscite in January. The price will be fixed by arbitration.

Fourteen Years a Commissioner.—The terms of Commissioners Loveland of San Francisco and Edgerton of Los Angeles of the Railroad Commission of California expire on Dec. 31, 1920. Commissioner Loveland has been holding office for fourteen years, and next to Commissioner Mills of the Minnesota Commission, has had the largest service in that respect of any man in the country. Commissioner Edgerton has held office for eight years.

Toronto to Submit Motor Bus By-Law to Citizens.—A by-law to authorize the expenditure of a maximum of $500,000 on motor buses as an auxiliary to the electric railway system of the Toronto Railway when taken over next year by the city of Toronto has received favorable consideration at a private meeting of the Toronto Board of Control, the Civic Transportation and the Harbor Commission. The matter will be sent on to the City Council.

Railway Loses Realignment Suit.—The Belt Line Railway Corporation, New York, N. Y., has lost its fight against an order to relay its rails on West Fifty-ninth Street by a decision handed down by the Court of Appeals. The court reversed the order of the First Appellate Division, which had reversed an order of the New York Special Term in granting a peremptory writ of mandamus to compel the corporation at its own expense to conform its surface rails upon West Fifty-ninth Street between Fifth and Eighth Avenues with the level of the street when repaved. The order of the Special Term was affirmed.

Further Retrenchment Planned.—H. A. Orr, resident manager of the local branch of the Southern Public Utilities Company at Anderson, S. C., has returned from Charlotte, where he went to attend a meeting of the managers of this company. Mr. Orr is quoted as stating that the consensus of opinion at the meeting in Charlotte was to the effect that further economies must be effected or a raise in rates be asked. He also states that while he thinks the company is economizing wherever possible, he hopes through judicious advertising of the service to bring about an increase in revenue, sufficient to make it unnecessary to seek an advance in fares from 7 cents to 8 cents.

Receiver Greets Pensioners.—An informal reception was held recently in the general office of the United Railways, St. Louis, when fifteen distinguished pensioners were greeted by Receiver Wells and Manager Perkins. The occasion was the last visit of these sturdy employees to the general office. Prominent among these pioneers was a man who had served under Receiver Wells' father, and another who had started to work for the old Union Line in 1869.

Crosstown Line Must Wait.—A rapid transit cross-town line in Brooklyn, N. Y., is not nearly so urgent as subway extensions in Staten Island, Manhattan and Flushing. This is the opinion of John H. Delaney, Transit Construction Commissioner, in answer to an inquiry about the Queensboro Plaza cross-town line, a recently revived improvement. The commissioner stated that the city has still to spend about $50,000,000 on the completion of the dual system, and no new additional routes should be considered before the present construction problems are completed.

Subway Plan Revived.—A plan for short subways for downtown streets in Detroit, Mich., has been revived by Councilman Nagel and preparatory to resubmitting a plan for short dips, similar to the plan he proposed last year, Mr. Nagel has put through the Council a resolution asking the Corporation Counsel to give an opinion as to whether or not the city has the power to assess the cost of such a system against abutting property owners in proportion to the benefits. Subways in all street car streets in the section bounded by Cass Avenue, Randolph Street and Adams Avenue and the Detroit River at a cost of approximately $12,000,000 are advocated by Councilman Nagel.

A General Clean-Up in Muskogee.—With the motto of "nothing to conceal, everything to disclose," W. M. Cutlip, now general manager Muskogee Electric Traction Company, has gone through the rank and file, and all employees guilty of "knocking down" fares have been "spurlos versenkt." It was shown at the November meeting of the Chamber of Commerce that the dismissal of the dishonest men increased the company's revenue $100 a day. One of Mr. Cutlip's first accomplishments was a wage advance of 5 cents an hour. With the increased receipts to which the manager looks forward improved and extended service will be granted the patrons of the Muskogee Electric Traction Company.

Financial and Corporate

$32,000,000 Power Deal

Electric Railway Lines Included in Purchase of MacKenzie Holdings by Ontario Commission

After two years of negotiations, Sir Adam Beck, chairman of the Ontario Hydro-Electric Power Commission, on Dec. 4 concluded an agreement with representatives of Sir William MacKenzie to purchase the entire electrical interests of the various companies promoted, controlled or influenced by him in the Toronto and Niagara district for $32,734,000. Sir Adam acted on behalf of the city of Toronto and the other Ontario municipalities comprising the hydro-electric power union.

RAILWAYS INCLUDED IN PURCHASE

The properties purchased are the Toronto Power Company, the Toronto & York Radial Railway and the Schomberg & Aurora Railway lines. These three properties include the systems of the Toronto Power Company, the Toronto & Niagara Power Company, the Electrical Development Company and the Toronto Electric Light Company

The purchase will be financed as follows: $6,971,295 of 6 per cent twenty-year bonds of the city of Toronto; $2,375,000 twenty-year 6 per cent bonds of the Hydro-Electric Power Commission; $613,528 twenty-year 5 per cent bonds of the Hydro Commission, and the assumption by the commission of $4,355,000 of underlying bonds of the Toronto Power Company, $13,558,917 bonds or debenture stock of the Toronto Power Company, $4,103,200 5 per cent mortgage bonds of the Electrical Development Company, $840,000 three-year 6 per cent notes of the Toronto Electric Light Company, and $13,100 outstanding stock of the Electrical Development Company

Thus there will be delivered to the former owners $9,958,823 of bonds and the new owners will assume responsibility for $22,775,177 of obligations of the companies taken over. The consummation of this large deal was practically necessary if the undertaking of the proposed hydro-radial railways was to be continued. The taking over of the Toronto Street Railway by the city of Toronto at the expiration of the franchise next September involves the question of securing an adequate power supply for its operation.

COMPLETING POWER SCHEME

Although assurances had been given from time to time that the Chippewa canal scheme of the Hydro Commission would be far enough advanced to supply the necessary power for the operation of the street railway next September, there were grave doubts that this could be accomplished. In addition it was essential that the franchises owned by the Toronto & York Radial Railway be extinguished if the proposed hydro-radial scheme was to be a success. Some of these were granted in perpetuity and so long as they existed there would always be difficulty.

By the acquisition of the foregoing power plants the total capacity of the plants owned, acquired and under construction by the Hydro-Electric Power Commission will be more than 1,000,000 hp. and the total investment by the end of 1922 will be between $160,000,000 and $170,000,000, by the Province of Ontario and the municipalities.

Cincinnati Going Behind on Eight Cents

The report of the Cincinnati (Ohio) Traction Company to W. C. Culkins, Street Railway Director, for the month of October shows a deficit larger than that for the month of September. The total increase in operating expenses over last year is 31.04 per cent. This increased cost is accounted for in the figures compiled by the auditor of the street railway director. The cost of power for October of this year was $131,329. Last October the cost of power was $78,779, an increase of 66.71 per cent. October a year ago there were 10,403,207 revenue passengers. This October there was a falling off of passengers to 18,059,657. The total cost of service this year was $897,447, as compared with $706,582 for October, 1919, an increase of 27.01 per cent. The deficit for October, 1919, was $25,678. The deficit for October, 1920, was $92,515.80, an increase of 127.7 per cent. The fare last year was 7 cents. This year it was 8 cents. The details are given in the accompanying table.

STATEMENT OF EARNINGS OF CINCINNATI TRACTION COMPANY

October	1920	1919	Per Cent Increase
Passenger revenue	$791,932	$721,032	
Other revenue and income	12,999	11,228	
Total	$804,931	$732,260	9 9
Operating expenses	73,628	47,220	55 9
Equipment	71,144	45,695	55.6
Power	131,329	78,779	66 7
Conducting transportation	277,993	244,600	13 6
Traffic	848	756	12 1
General and miscellaneous	43,636	36,916	31 8
Total	$598,580	$453,969	31.8
Taxes and rentals of viaducts	$67,705	$448,694	39 0
Rental of leased lines	104,030	104,030	....
Interest on equipment: Notes B 1; Interest and sinking fund, reducible debts	17,971	28,695	78 9
Interest on equipment: Notes G 1 2; interest on sinking fund notes and debentures	44,126	6,007	
Return on capital	35,043	35,043	....
Taxes, franchise	29,991	29,483	....
Total cost of service	$897,447	$706,582	27 0
Total revenue and income	804,931	732,260	9 9
Deficit	$92,515	$25,678	127.7
Fare	8 cents	7 cents	
Revenue passengers	10,059,657	10,403,207	
Car-miles	1,740,547	1,884,780	

Stockholders Organize

Local Holders of Stock of Kansas City Railways See No Need for Foreclosure Now

Holders of preferred stock of the Kansas City (Mo.) Railways resident in Kansas City held a meeting on Nov. 26, at the Hotel Baltimore, pursuant to informal suggestions. John I. Glover, elected chairman of this meeting, was asked to appoint a committee to take such steps as seemed necessary with reference to the present situation of the company. The committee, appointed since the meeting, consists of James E. Gibson, chairman; C. D. Parker, Robert M. Goodlet, Henry Florsheim and Edward J. Corrigan. Mr. Gibson was former general manager of the railway.

The immediate cause of the action by local stockholders is said to have been reports that first mortgage bondholders anticipated foreclosure. Such report seemed premature and doubt was expressed at any result of this nature.

It is made clear that there is no belligerent motive in the formation of a stockholders' committee.

There were about twenty-five holders of preferred stock at the meeting. Two or three large local stockholders not present had previously indicated their desire to co-operate.

Frank Hagerman has announced that he represents J. O. Armour, the largest stockholder and an unsecured creditor. He has so far taken no active part, as Mr. Armour's representative, in the court proceedings.

After the meeting on Nov. 26 there was casual conversation among stockholders, touching upon a possible means of regulating jitney service in Kansas City. A leading business man suggested that perhaps service might be suspended for a few days, in which period the inability of jitneys to maintain regular and continuous operation would be demonstrated. Legislation long desired might then be secured. The conversation was not a feature of the meeting.

Change Proposed in Reorganization Plan

Cash Needed to Pay Off Existing Loans of International Company at Buffalo and Make Good the Operating Deficit

Holders of the collateral trust 4 per cent gold bonds of the International Traction Company, Buffalo, N. Y., have received copies of a new plan for the reorganization of the corporation. The old plan was abandoned a month ago after an omission had been found in the notice to depositing bondholders. The protective committee of which Elliott C. McDougal, president of the Marine Trust Company, Buffalo, is chairman feels that in view of improved operating conditions it is warranted in recommending a plan which will permit the free distribution of a substantial amount of the railway company stock to those depositors who are not able or willing to contribute any part of the funds required.

It is pointed out that the "inherited hostile attitude of the public toward the corporation has been changed to one of favorable comment" and that in view of these facts the committee has reached the conclusion that the financial position of the railway company would be reasonably safe if enough cash were provided to pay off existing loans and make good the operating deficit, and if an amount of bonds sufficient to provide for necessary renewal and construction expenditures were set aside in the hands of the trustees.

"Some provision for new capital is essential at this time because of the inhibition contained in the supplemental indenture to the railway refunding and improvement 5 per cent mortgage which as a condition precedent to the issuance of additional bonds requires that the net earnings for a period of twelve consecutive months shall have equaled 7½ per cent of the total funded debt of the company," the notice to bondholders says. It adds that the present annual gross earnings of the company are approximately $11,000,000, but the net earnings for 1920 will not exceed the present fixed charges.

PLAN SUMMARIZED

The underwriters of the new plan now recommended have agreed to purchase at certain prices voting trust certificates for 94,487 shares of railway stock, par value, $9,448,700, and $2,000,000 in principal amount of railway 5 per cent bonds, less the amounts which the depositors elect to purchase in accordance with the offers made to them. There will be no underwriting commission on the bonds; the underwriting commission is 5 per cent upon the full purchase price for the voting trust certificates. The underwriting is conditioned upon the establishment of a voting trust for five years.

The plan of readjustment recommended by the committee is substantially as follows:

> The committee proposes to transfer and deliver to voting trustees all the stock of the International Railway, consisting of 167,075 shares, with power to vote the same for a term of five years, receiving in exchange therefor voting trust certificates issued under an appropriate voting trust agreement.
>
> It is proposed to distribute among the depositors pro rata and free of charge voting trust certificates for 72,588 shares of railway stock, representing four shares for each $1,000 traction bond deposited under the protective agreement. Depositors will be offered for each $1,000 traction bond deposited under the protective agreement the opportunity to purchase voting trust certificates for five shares of railway stock and $100 in principal amount of railway 5 per cent bonds, the price to be $100 plus accrued interest.
>
> Depositors also will be offered the opportunity to purchase the remainder of the voting trust certificates at the price of $10 per share and the remainder of the $2,000,000 in principal amount of railway 5 per cent bonds which have been underwritten at the price of 50 per cent of the principal plus accrued interest.
>
> The committee will allow depositors a reasonable time for making elections to purchase the voting trust certificates and bonds. The purchase price will be payable at the time of making the election to purchase and the voting trust certificates and bonds will be delivered as soon as practicable after payment of the purchase price.
>
> In addition the committee proposes to sell to the underwriters at the prices above stated the portions of the voting trust certificates for 94,487 shares of railway stock, and of the $2,000,000 in principal amount of railway 5 per cent bonds, which the depositors do not elect to purchase in accordance with the offers made to them under this reorganization plan.
>
> The committee proposes to transfer and deliver to the voting trustees $1,944,000 in principal amount of the railway 5 per cent bonds and $640,500 in principal amount of underlying 6 per cent bonds to be held in trust but with full power in the voting trustees to sell or otherwise use the bonds or any part of them and the proceeds thereof for the benefit of the railway company or the holders of the voting trust certificates for railway stock, as the voting trustees in their discretion may from time to time deem to be necessary or desirable, provided, however, that the interest payable on the bonds while held by the voting trustees is to be returned to the railway company. After disposing of the voting trust certificates and the bonds as provided in the reorganization plans and after paying and discharging its obligations and expenses, including the compensation of its members, the committee proposes to pay over to the railway company all cash and other property remaining in its hands.

Under this plan the protective committee says it will be able to pay its obligations and expenses and to make good the operating deficit of the railway, the voting trustees will be in a position to use the bonds set aside in their hands to meet future cash requirements of the railway and the depositor of each $1,000 traction bond will have an opportunity, by the payment of $100, to secure a par or principal amount of securities equal to the principal of his original investment, as follows: $400 railway stock distributed free; $500 railway stock and $100 railway 5 per cent bonds for $100 cash payment.

Chairman McDougal tells depositing bondholders that no promise can be made at this time of a return on the stock. The estimated gross earnings this year are $11,175,000; operating expenses and taxes, $9,525,000, and fixed charges $1,650,000.

If objections are not filed the committee expects to adopt the amendment and give notice to the depositors and thereafter proceed to carry out the plan as expeditiously as possible.

Members of the committee in addition to Chairman McDougal are Jacob Gould Schurman, Thomas DeWitt Cuyler, R. Walter Leigh and Thomas E. Mitten. A. F. Halsted, 62 Cedar Street, New York, is secretary of the committee. The Guaranty Trust Company, New York, is the depository.

P. R. T. Increase Disappointing

Mr. Mitten Appears to Be Vindicated by First Month's Result Under Commission Ruling

Thomas E. Mitten, president of the Philadelphia (Pa.) Rapid Transit Company, has reported to the Public Service Commission the results of the increase in fare in Philadelphia which became effective on Nov. 1. He has also taken up with the commission the need for the continuance of skip-stops.

Mr. Mitten says that the actual result of the new schedule closely approaches the flat rate of 5 cents per passenger asked previously by the company. He adds it is too early to say what effect the new fare has on short riding, but that it is evident the operating economies possible under the tariff formerly proposed are not obtainable under the plan which the commission ordered the company to adopt.

With regard to skip-stops Mr. Mitten intimates that he does not favor doing away with them entirely. He declares that skip-stops are the means of saving about $1,000,000 a year in operating costs. He wrote to the commission in effect that the economy of $1,000,000 worked by the skip-stop, if now dissipated, will decrease by $20,000,000 the amount of city subway and elevated investments upon which 5 per cent per annum can be paid by the operating company.

The sum of $429,742 of added passenger earnings was collected during the month on account of the increase in the rate of fare to 7 cents, with 4 tickets for 25 cents. This is shown in the following summary:

Passenger earnings same period last year	$3,019,977
Average increase ten months to Oct. 31, 6.85 per cent	206,868
Estimate of earnings Nov., 1920, at former 5-cent fare	3,226,845
Increase attributable to higher fare, 14.23 per cent	429,742
Actual passenger earnings for Nov., 1920	$3,056,587

It is estimated that $2,562,736 of added passenger earnings would at this rate be collected for the period of six months from Nov. 1, 1920, to April 30, 1921. In regard to the valuation Mr. Mitten said:

> The valuation of the property of the Philadelphia Rapid Transit Company is progressing and when finally determined will be the basis of the fair return thereafter payable to the owners of the property. After this is done skip-stop and other economies will no longer be of financial advantage to the company, but will directly advantage the community served. The skip-stop economy of $1,000,000, if now dissipated, will decrease by $20,000,000 the amount of city subway and elevated investment upon which 5 per cent per annum can be paid by the operating company.

$32,083,389 Is St. Paul City Railway Value

This Figure Is Reported by Drum & Company, Valuation Experts, as the 1920 Reproduction Value Including Superseded Property

A. L. Drum & Company, consulting engineers, Chicago, reporting to Horace Lowry, president of the Twin City Rapid Transit Company, have found the value of the total property of the St. Paul (Minn.) City Railway to be $32,083,389 on the basis of cost to reproduce new as of Jan. 1, 1920, inventory and unit prices. A second figure submitted, based on the cost to reproduce new as of Jan. 1, 1916, using the inventory of Jan. 1, 1920, and average unit prices of labor, material, apparatus and equipment which prevailed during the five years from 1911 to 1915 inclusive, or the ten years from 1906 to 1915, inclusive, is $21,368,781. In either case the figures represent the minimum amount of capital that would have been required actually to reproduce the physical property as of Jan. 1, 1920, plus the capital invested in development.

THIS latter item is of particular interest. In discussing it, the report of the engineers goes on to state that in preparing the report and appraisal it became apparent that a large amount of capital had been invested in the development of the property during the early years which was superseded prior to the expiration of its useful life, owing to the development in the art of transportation, or to meet the demands of the public in bringing the property to its present state of efficiency.

STATEMENT OF VALUATION OF ST. PAUL CITY RAILWAY, EXCLUSIVE OF SOUTH ST. PAUL LINE OUTSIDE OF CITY LIMITS

Item	Cost to Reproduce New 1916	Cost to Reproduce New 1920	Per Cent Increase 1920 over 1916
Track	$3,333,977	$6,150,078	84.47
Bridges and subways	111,116	136,704	23.03
Tunnels	304,518	495,025	62.56
Paving	1,807,559	2,667,472	47.57
Electrical distribution system	1,330,895	2,132,022	60.19
Rolling stock	2,662,979	5,856,542	119.92
Substation equipment	408,331	625,280	53.13
Shop machinery and shop tools	497,188	848,822	70.73
Buildings	1,052,640	1,656,282	57.35
Furniture, fixtures and office equipment	61,863	88,032	42.30
Stores, floating tools and miscellaneous equipment	790,440	831,423	5.18
Miscellaneous items not included in inventory	127,105	127,105	00
Total exclusive of land	$12,488,611	$21,614,787	73.07
Administration, organization and legal expense	519,350	654,495	26.02
Taxes during construction	279,428	399,402	42.94
Interest during construction	1,509,312	2,494,348	65.26
Working capital	300,000	440,000	46.67
Total	$2,608,090	$3,988,245	52.92
Grand total, exclusive of land	$15,096,701	$25,603,032	69.59
Land	1,087,014	1,087,014	00
Grand total, including land	$16,183,715	$26,690,045	64.92

A thorough investigation was made of such items of superseded property and those items were included only where it was apparent from records that such property was superseded or abandoned after a short period of operation, or that the net earnings of the company had not been sufficient to amortize the capital invested in superseded property.

The estimated cost of this property superseded by constant improvement, radical changes and unforeseen developments covers the replacement and supersession of such serviceable property as horse and cable lines superseded by electric traction, initial electric cars and power stations superseded by modern cars and modern power stations, and serviceable track removed and replaced on account of new paving ordered by the city.

In St. Paul the horse-car period began in 1872 and continued until 1890 and 1891, when all horse-car lines were replaced by initial electric traction lines. The horse-car system consisted of 49.02 miles of single track, twenty-three buildings and 118 horse cars.

The cable period began in 1887 and continued until 1893, when it was superseded by initial electric traction lines. The cable system consisted of 14.785 miles of cable railway, two power station developments and 104 cars.

The initial development of electric traction commenced in 1889 and the early experimental stages continued until about 1904. During this period the company made an extensive power station development at the Hill Street station, including the substations and electrical distribution lines connected therewith. At the same time, the report declares, all of the single-truck cars were replaced by modern double-truck cars, and 30.176 miles of track was removed and replaced before the expiration of its useful life on account of new paving ordered by the city.

VALUE OF SUPERSEDED PROPERTY

The figures included in the valuation for the value of such superseded property was itemized as follows: For horse-car lines, $1,384,778; for cable lines, $1,564,808; for initial electrical development, $1,242,677, and for track reconstruction destroyed and replaced owing to new paving laid by the city, $648,275; making a total of $4,840,538. This item, termed in the engineer's report as the "capital invested in the development of the property," takes the place, presumably, of an entry for "going concern value," for no item of value under this head is included.

The principal property of the St. Paul City Railways as of Jan. 1, 1920, is shown to consist of 168.37 miles of single track; 367 passenger cars; 38 miscellaneous service cars; four substations containing conversion apparatus having an aggregate rated capacity of 20,400 kw., all primary power being furnished by the Minneapolis Street Railway from its main station located in Minneapolis; car houses, office, shops, and miscellaneous buildings.

A comparison of the cost of reproduction new on the bases employed in the work is contained in the accompanying table, in which the various main elements of the property are itemized. To the value as shown in this table, which cover the property within the city limits of St. Paul only, should be added the sum of $344,528 and $552,805 for 1916 and 1920, respectively, to obtain the total property value figures quoted in the first paragraph, these amounts covering the value of the property outside the St. Paul city limits. The main item of this property outside the city limits consists of 8.29 miles of single track, with overhead trolley, feeder wires, etc.

In commenting on the condition of the property, the report states that it "has been carefully and properly maintained and is in an efficient operating condition, capable of supplying all the present demands of reasonable service to the public in the territory, and therefore the cost to reproduce new represents the actual value of the physical property, as a similar property could not be reproduced at a less amount."

The report includes figures to show the depreciated present value, defining the deductions as representing the amount of existing depreciation due to wear or mechanical deterioration ascertained by field inspection and measurement. The cost to reproduce new less depreciation as thus defined, for the total property and comparable with the total value figures given in the first paragraph, are estimated to be $20,479,437 as of Jan. 1, 1916, and $30,547,539 as of Jan. 1, 1920.

Shore Line Near New Haven to Be Restored

Louis I. Levinson of the U. S. Wrecking Company, who some time ago purchased a part of the Shore Line Electric Railway, is proceeding with plans looking toward the preservation of the line as an operating unit for the benefit of residents of the territory affected by the discontinuance of service. His purpose, as reported now, is to form a company with a capitalization of $600,000 of bonds and an equal amount of stock and to issue ten shares of stock as a bonus with each $1,000 of bonds subscribed. The bonds would be secured by a first mortgage on the property. They would bear interest at 7 per cent. The trustee of the issue will be the Merchants' National Bank, New Haven.

Mr. Levinson, it is reported, paid $570,000 for the road, but it is said will receive only $540,000 for his interest, the difference between that amount and the total sum realized from the sale of the $600,000 of bonds being used to provide working capital. Mr. Levinson has already made a profit by selling the rails from the Stony Creek branch and those east of Saybrook. He will turn over to the new owners all the equipment, including power houses, substations, etc. It is said that pledges of subscriptions have already been made sufficient to insure the success of the new plan.

I. R. T.'s October Deficit Higher Than in 1919

For the month of October, 1920, the Interborough Rapid Transit Company, New York, N. Y., shows a deficit in its net corporate income of $407,792 against a deficit of $218,762 for the corresponding month of 1919. For the past three months now the Interborough has been consistently decreasing its deficit, having lost about $600,000 in August and $500,000 in September. For the four months ended Oct. 31, 1920, the net income is a deficit of $2,119,927 against a deficit of $1,742,969 for the same period of last year. In October, 1920, the number of revenue passengers carried increased more than 9,000,000 over the same month in 1919 and for the four months ended October, 1920, the passengers carried increased about 37,000,000, or 13.3 per cent, over the similar period of 1919. The operating ratio for the month was 67.44 per cent, while for the four months it was 67.97 per cent.

SUMMARY OF EARNINGS OF INTERBOROUGH RAPID TRANSIT COMPANY

Month Ended Oct. 31:	1920	1919	Percentage Change Over 1919
Gross operating revenue	$4,733,162	$4,280,838	10.6
Operating expenses	3,191,896	2,668,307	19.6
Net operating revenue	$1,541,266	$1,612,530	— 4.4
Total taxes	220,088	216,401	1.7
Income from operation	$1,321,178	$1,396,129	— 5.4
Non-operating income	49,766	40,130	24.0
Gross income	1,370,964	1,436,259	— 4.5
Interest, rentals, etc., including Manhattan guarantee	1,778,757	1,655,022	7.5
Net corporate income (exclusive of accruals under the provisions of Contract No. 3 and related certificates which under these agreements with the City are payable from future earnings)	*$407,792	*$218,762	—86.8
Operating ratio (per cent)	67.44	62.33	5.11
Passengers carried (revenue)	88,354,850	79,307,822	11.4
Four Months Ended Oct. 31, 1920:	1920	1919	Percentage Change Over 1919
Gross operating revenue	$17,175,736	$15,245,108	12.7
Operating expenses	11,673,984	9,699,512	20.3
Net operating revenue	$5,501,751	$5,545,595	— 0.8
Total taxes	873,219	857,010	1.9
Income from operation	$4,628,531	$4,688,585	— 1.3
Non-operating income	207,929	175,076	18.8
Gross income	$4,836,461	$4,863,661	— 0.6
Interest, rentals, etc., including Manhattan guarantee	6,956,388	6,606,631	5.3
Net corporate income (exclusive of accruals under the provisions of Contract No. 3 and related certificates which under these agreements with the City are payable from future earnings)	*$2,119,927	*$1,742,969	—21.8
Operating ratio (per cent)	67.97	63.62	4.35
Passengers carried (revenue)	319,606,420	282,186,716	13.3

* Deficit.

Financial News Notes

Abandonment at San Diego Approved.—The California Railroad Commission has issued a ruling permitting the San Diego Electric Railway to discontinue the line that extends from First and Washington Streets to Fifth and Spruce Streets. The company showed that the entire system was operated at a loss of $54,420 from January to September, 1920. The company was granted permission to tear up the tracks on the abandoned line.

Issue of Funds for Improvements Approved.—The department of Public Utilities of Massachusetts has approved of use by the Eastern Massachusetts Street Railway, Boston, Mass., of proceeds of the sale of $2,000,000 of serial bonds for additions to the property, amounting to $574,375. The improvements include fifty one-man cars at cost of $337,500 and purchase of equity in machinery of the Quincy Point Company's power house at a cost of $115,000.

Railway Acquires Power Company.—George Kidd, general manager of the British Columbia Electric Railway, announced at Vancouver, B. C., on Dec. 3 that all arrangements had been completed for the formal taking over of the Western Canada Power Company in New York on Dec. 23 by an issue of debentures guaranteed by the railway amounting to between $7,000,000 and $8,000,000. The present directors of the power company will resign and be replaced by administrative officers of the British Columbia Electric Railway.

New Jersey Valuation Nearing Completion.—Ford, Bacon & Davis, New York, N. Y., who are appraising the property of the Public Service Railway in New Jersey, expect to have the work completed inside of six months, according to the report of the special valuation commission, consisting of State Treasurer William T. Read and State Comptroller Newton A. K. Bugbee. The appraisers are gathering data on which to place a valuation for use by the Board of Public Utility Commissioners in making permanent rates to be charged by the railway throughout the State. The State appropriated $100,000 under the provisions of an act which has been summarized previously in the ELECTRIC RAILWAY JOURNAL.

Special Master at Kansas City.—John Kennish, who served four years on the Public Service Commission of Missouri, and was reappointed three months ago, has been made master in chancery in Kansas City (Mo.) Railways receivership matters. Judge Kennish, immediately upon the appointment on Nov. 29, resigned from the State Commission, and on Dec. 1 qualified as master. Judge Kimbrough Stone of the federal court, under whom the receivership is being conducted, had intimated that he might appoint a master to relieve him of the burden of hearing evidence in case controversies should become voluminous. Judge Kennish has maintained his prvate law office in Kansas Cty for several years. The master notified parties at interest to appear on Dec. 9, to arrange for a hearing, particularly regarding petitions that the properties be sold.

Receiver Named for Cincinnati-Dayton Line.—George P. Sohngen, president of the Hamilton Dime Savings Bank, Hamilton, Ohio, has been appointed receiver of the Cincinnati & Dayton Traction Company by Judge Clarence Murphy. The original action was started by the Citizens' Savings Bank & Trust Company, Cleveland, Ohio. Argument was heard last July. In September the court rendered a decision on some of the points in dispute, but held in obeyance the naming of a receiver. Meanwhile Judge Murphy has been considering other questions establishing the rights of holders under various liens. On these matters he has ruled as follows: The property purchased for private right-of-way between Cincinnati and Dayton is covered by mortgages on the original right of way; the second track on Central Avenue, Court Street and North B Street, Hamilton, comes under the mortgages; the mortgagees can have personal judgment against the Cincinnati, Dayton & Toledo Traction Company; the transmission lines are a part of the power house and are not covered by the mortgages.

Traffic and Transportation

Eight Cents Enough

Special Masters Recommend Increased Fare for Des Moines City Railway—Want Service Improved

John A. Guiher, Paul Beer and E. D. Perry, special masters in chancery appointed by Federal Judge Martin J. Wade to investigate the condition of the Des Moines (Iowa) City Railway, have filed a report suggesting that fares be advanced to 8 cents for adults and to 4 cents or seven tickets for a quarter for school children. They also recommend that in the event the 8-cent fare is granted that a 40 per cent increase in service for eighteen hours daily be put into effect by the railway. A 6-cent fare is now charged.

In their report the masters say:

> From our examination we find and believe that an 8-cent fare for adults and a 4-cent fare, or eight tickets for a quarter, for school children and high school pupils will be required to furnish the necessary revenue to pay the operating expenses, fixed charges, interest and taxes with a 40 per cent increase over the present service, and we recommend the establishment of fares with increase in service in accordance with said finding.
>
> Our estimate shows a surplus of $61,460, which in our judgment is none too wide a margin for meeting emergencies.

SERVICE IMPROVEMENT URGED

In presenting their report the masters also drew certain conclusions which resulted from their investigation. These findings are as follows:

> The standard of service now given is fully 30 per cent below that furnished in 1914.
>
> A reduction in service has been necessary because the receipts of the company would not cover the cost of operating on the old schedule.
>
> The cost of labor has increased from 107 to 149 per cent over what it was in 1916 and the cost of fuel has increased 146 per cent. As these are the principal items in the cost of operating the system they are the principal factors in determining the costs.

The masters state further that the company should have greater support from the people of Des Moines because it is a public utility dependent entirely upon and responsible to the public, and that the management of the railway both under its own officers and under the receivers has been efficient.

The masters arrived at the surplus of $6,460 accruing from the fares they suggest by computing the number of passengers who have ridden the cars while the system has been operating under direction of the court and also for several years previous to that time. They estimate that 35,429,335 adult passengers will produce a revenue of $2,834,346 and that the 4-cent fare for children will give an additional revenue of $50,863. Allowing for $14,276 derived from children's tickets sold seven for 25 cents this would make a total revenue of $2,834,486, from which must come all the costs of operation without any provision for profits.

Attorneys for the company contended that the costs of operation had increased from 100 to 150 per cent in the past few years while the revenues of the company had increased approximately 40 per cent. The company further introduced evidence to show that it could not increase service without a material increase in fares and that it had already used both additional capital and absorbed surplus in meeting operating expenses.

CITY ASKS NICKEL RATE

H. W. Byers, attorney for the city, centered his fight against a further increase upon the premise that by reducing service the company had decreased its revenues and that if a material increase in service were brought about that it would provide sufficient revenues. Mr. Byers contended that a 5-cent fare would produce ample revenue if service were furnished in accordance with traffic needs. He denied the company's claims that there had been an increase in operating costs sufficient to warrant an 8-cent fare and further claimed that the franchise contract which provided for a 5-cent fare for a period of twenty-five years was still valid.

It is expected that Judge Wade will make a ruling on the masters' recommendations at once. In the meantime the City Council has authorized the appointment of a board of auditors to go over the books of the company to check the appraisal recently made.

Commission Invites Public's Suggestions

The Public Utilities Commission of Idaho has just issued an order requiring every public utility operating in the state of Idaho to post in each of its main and branch offices, waiting rooms, sales or show rooms, etc., in a place "most likely to meet the notice of its patrons or the public," notices, to be furnished by the commission, upon request, reading as follows:

> NOTICE TO THE PUBLIC
>
> The Public Utilities Commission has jurisdiction over:
>
> 1. Boat
> 2. Electric Power
> 3. Express
> 4. Gas
> 5. Railroad
> 6. Sleeping Car
> 7. Street Railroad
> 8. Telegraph
> 9. Telephone
> 10. Water
> 11. Warehouse
> 12. Wharf
>
> RATES—SERVICE—REGULATIONS
>
> (except those of cities and villages, and mutual companies).
>
> If you have any question, complaint or suggestion as to any rate or fare charged, or as to the kind or adequacy of any service furnished, or as to the scope or effect of any regulation or rule, please inform the commission.
>
> We can help you only when we know your needs.
>
> Address, phone or call on
> PUBLIC UTILITIES COMMISSION,
> Boise, Idaho.

Fare Increase Waived

Minneapolis Street Railway Voluntarily Defers Charging 7 Cents—Ninety-two More Cars in Service

There will be no increase in fare in the immediate future on the electric railway lines of Minneapolis, Minn. The Minneapolis Street Railway, a subsidiary of the Twin City Rapid Transit Company, will continue to operate for the present at least at a 6-cent fare. This is in spite of the fact that the company has been authorized by the municipal authorities to charge a 7-cent cash fare with four tickets for a quarter, beginning Dec. 15.

RAILWAY ACTS VOLUNTARILY

The management's action in waiving the fare increase was entirely voluntary. It resulted from the fact that the company has not yet been able to place in service the full number of cars called for by the terms of the agreement with the city for a higher fare. In a letter to the City Council, Horace Lowry, president of the company, declares that the fare will not be raised "until such time as increased service and resulting increased expenses justify us in so doing." Meanwhile Mr. Lowry proposes to retain the skip-stop in the interest of both the public and the railway.

In his letter to the Council Mr. Lowry points out that on Aug. 16 last, when the 6-cent fare took effect, the company operated a maximum of 417 cars on its Minneapolis lines. On Nov. 26, during the same hours, it operated 509 cars, an increase of ninety-two. Mr. Lowry's letter follows in part.

> Pursuant to the terms of an ordinance of the city of Minneapolis, duly adopted by your honorable body on the sixth day of August, 1920, this company was authorized to increase its street car fare to a 7-cent cash fare with four tickets for 25 cents. Under this ordinance, on the sixteenth day of August, 1920, this company put into effect a 6-cent fare, fully expecting to increase the fare on Dec. 15 to the 7-cent cash fare with four rides for 25 cents, as provided in the ordinance.
>
> ### MORE CARS IN SERVICE
>
> Because of the fact that we have as yet been physically unable to put in service the full number of cars finally contemplated by the ordinance, we are of the opinion that we should not ask the car riders of this city to pay the 7-cent cash fare on Dec. 15, and we now advise your honorable body that, if agreeable to your wishes and without surrendering any of our rights under said ordiance, we will not further increase the fare until such time as increased service and resulting increased expenses justify us in so doing.
>
> For your information we beg to state that on the sixteenth day of August, 1920, during the rush hours, we operated 417 cars in this city, and on the twenty-sixth day of November, during the same hours, we operated 509 cars, an increase of 92 cars.
>
> ### WILL RETAIN SKIP STOP
>
> We wish to take this opportunity of advising you that the continuance of the skip stop is of great assistance, as it enables the company to render much better service to the traveling public with the number of cars operated than if it was discontinued. The car riding public of this city is vitally interested in service and fare, and the skip stop has a very important bearing on both.

The fare ordinance was passed by the City Council on Aug. 9 to enable the company to meet the demand of its employees for higher wages. They had threatened to strike on Aug. 14.

Dime Fare Asked in Jersey

Public Service Railway Loses $1,200,000 in Year Under 7-Cent Rate—System Faces Disintegration Unless Relief is Granted

The Public Service Railway of New Jersey on Dec. 7 filed with the State Board of Public Utility Commissioners a notice of its intention to charge a 10-cent flat fare with free transfers, beginning Jan. 1 next. The board immediately suspended the new rate pending determination by the courts of the board's legal status. The application for a 10-cent fare came exactly one year after the abandonment of the zone fare system, and the introduction of a 7-cent rate with 1 cent for a transfer. Thomas N. McCarter, president of the railway, in a letter to the board, stated that the 7-cent fare had failed. It has provided no depreciation fund whatsoever, and in addition has resulted in an operating deficit of $400,000, making a total deficit for the year of approximately $1,200,000. The total operating deficit of the railway for the past three years now amounts to $3,600,000.

MR. McCARTER notified the board that "nothing will save the property except a 10-cent fare." He stated that the system must either be saved for the use of the people of the state promptly, or it will disintegrate, if, in fact, it continues to operate." He declared that the Public Service Corporation, the owners of the railway's stock, cannot make further advances.

Mr. McCarter declared that when the zone system was abandoned it was thought that the 7-cent fare would keep the company going, although without return upon its capital stock, until such time as the valuation of the property of the company, then in process of being made by the utility board, should be completed, which it was thought would be within a few months. Since the passage by the Legislature of the act providing for a valuation of the company's properties by independent engineers the board has suspended further hearings in the valuation inquiry which it was conducting. The valuation by the engineers is now nearing completion.

After declaring that the company faces a total operating deficit of $1,200,000 for the present year, Mr. McCarter continued:

> This deficit has come about by further increased costs of labor and materials over and above the amount estimated a year ago.
>
> These increased costs are represented by the amount of the deficit, which would have been very much greater had it not been for the receipt by the company of a larger increased revenue than was estimated a year ago.
>
> This deficit of $1,200,000 for the year comes on top of similiar deficits for the previous two years, which have resulted in a total deficit in operating and depreciation amounts of approximately $3,600,000 for the past three years.
>
> This is a situation that cannot continue any longer. This property must either be saved for the use of the people of the state promptly, or it will disintegrate, if, in fact, it continues to operate. The Public Service Corporation, the owner of its stock, and its financial backers, cannot and will not increase its burdens by further advances.
>
> DIME FARE ONLY REMEDY
>
> A very careful study of the remedy for the situation has been made and it is perfectly plain that while the present condition of operating cost and unregulated and unfair competition exists, nothing will save the property except a 10-cent fare. This lesson has already been learned in many cities of the country. * * *
>
> But whatever the facts may be in other places, the necessity here is perfectly plain. The best estimate that we can make of what the rate will do for the next fiscal year is, that it will enable the company to pay its present operating expenses, its fixed charges, set apart a proper amount for current depreciation, make up its operating deficit, and one-third of its past deficit in the depreciation allowed by the board, so that after three years the depreciation loss of the last three years will have been recouped.
>
> The railway company has also been obliged, during the last three years, to provide additional moneys for absolutely necessary capital expenditures, thus adding to the plight in which it finds itself. It can, however, borrow no more and no further capital expenditures can be made until the situation is relieved, whatever their necessity.

INCOME STATEMENT—PUBLIC SERVICE RAILWAY

Account for Years 1917, 1918 and 1919 and Year 1920 with November and December Estimated, and Estimate for 1921 on 10-Cent Fare Basis

	1917 Actual	1918 Actual	1919 Actual	1920 Two Months Estimated	1921 Estimated 10c. Basis
Revenue from transportation	$17,970,893	$19,154,097	$22,384,870	$26,006,909	$30,427,162
Revenue from other railway operations	460,262	506,633	536,519	592,042	592,000
Total railway operating revenues	$18,431,155	$19,660,730	$22,921,389	$26,598,952	$31,019,162
Railway operating revenue deductions	12,551,340	14,857,379	18,590,941	22,080,449	24,876,976
Railway operating income	$5,879,814	$4,803,350	$4,330,448	$4,518,502	$6,142,186
Auxiliary operations—Income	11,517	9,408	6,655	7,626	6,000
Total operating income	$5,891,331	$4,812,759	$4,337,103	$4,526,129	$6,148,186
Non-operating income	217,687	184,254	186,559	205,731	184,734
Gross income	$6,109,019	$4,997,014	$4,523,663	$4,731,861	$6,332,920
Total income deductions	4,972,063	5,001,836	5,145,832	5,165,369	5,237,731
Net income	$1,136,956	*$4,822	*$622,168	*$433,508	$1,095,189

* Deficits.

Steadily increasing jitney competition is largely responsible for the railway's present plight. Several months ago the railway instituted court action against many bus operators and a number of municipalities alleged to be unlawfully competing with it. It is reported that a bill will be introduced at the coming legislative session to place the buses under state control.

Meanwhile the situation has been complicated by the action of Governor Edwards in removing from office the members of the Board of Public Utility Commissioners. Governor Edwards has named a new board, but as yet his appointees have not been confirmed by the State Senate. Attorney-Genera McCran has begun quo warranto proceedings to determine the present status of the "ousted" commissioners, who contend that the Governor has no power to remove them. Pending a ruling by the Supreme Court the old board declines to act.

Lines on Warrant Basis

Seattle City Council Refuses to Grant Municipal Railway an Immediate Increase in Fare

Efforts to make effective immediately an increase of rates on the Seattle (Wash.) Municipal Railway proved unsuccessful for the second time when the City Council at a special session on Dec. 3 refused to pass in emergency form the Thomson ordinance establishing a token fare of 8⅓ cents with the privilege of transfers. With three Councilmen standing firmly against the proposed advance in rates, the bill lacked the seven votes which were required for its passage as emergency legislation.

Councilmen were unable to predict at the conclusion of the meeting on Dec. 3 the procedure that will be followed. After its rejection in committee of the whole, the bill was referred back to the Council with the recommendation that it be sent back to the city utilities committee, from which it had been taken for consideration in committee of the whole. The consensus of opinion at present seems to be that for a time at least no further effort will be made to adopt the ordinance in emergency form.

CITY TREASURER TAKES ACTION

Adding another complication to the situation, E. L. Terry, City Treasurer, announced immediately after the Council session that the city railway fund would be placed on a warrant basis on Dec. 10. He had previously notified the Council that the fund would go on the warrant basis on Dec. 24 because of the heavy overdraft. Upon learning that the fare increase bill had been rejected Mr. Terry revised his plan and advanced the date two weeks.

Reluctance on the part of the supporters of the bill to enact the ordinance without an emergency clause attached is due to the fact that in that form the provisions of the bill would not become effective until thirty days after approval of the measure by the Mayor. During that time, it is claimed speculators would attempt to corner the available supply of metal tokens at the present rate of 6¼ cents.

Another reason for the hesitation in passing the ordinance in the usual form is understood to be fear that the measure might be forced to submission as referendum measure An emergency ordinance is not subject to referendum but an ordinance in the regular thirty day form must be submitted to the people for approval or rejection upon petition of a certain number of qualified voters equal to 10 per cent of the vote cast for Mayor at the preceding municipal election.

If a referendum should be invoked, enforcement of the ordinance would be held up until the question is settled at the polls either at the election next March or a special election at an earlier date. Certain city officials doubt as to whether the measure would carry if submitted to popular vote.

Stage Lines Increase Fares

Increased fares on three Southern California stage lines were announced by the State Railroad Commission on Nov. 17. This was in response to recent blanket applications of the Pickwick Stages, Inc., operating between Los Angeles, San Diego and Imperial Valley; United Stages, Inc., running between Los Angeles and Santa Barbara, and also to San Diego and Imperial Valley, and the White Star Auto Stages, operating between San Diego and El Centro. This subject was reviewed in the ELECTRIC RAILWAY JOURNAL for July 31, page 248, and Sept. 25, page 622.

While the commission's report indicated an average increase in fares of approximately 15 per cent, the management of the affiliated auto stage lines stated that the order of the commission would serve to give in certain cases a maximum increase of only 10 per cent and in other cases an even lower rate than now applying.

The most important feature of the order appears to be the fact that for the first time auto bus stage fares in Southern California are now standardized and inequalities previously existing between different communities are removed. The three companies affected operate a total of more than 600 miles of auto stage lines.

Franchise Restrictions Overruled

The Public Service Commission for the Second District of New York has issued a ruling to the effect that it is empowered to regulate fares on the Troy lines of the United Traction Company, Albany. The company is now seeking a 10-cent fare on all its lines, the present fare being 7 cents. The city of Troy has contended that in view of franchise provisions limiting the rate of fare on the Troy lines to 5 cents the commission has no power to raise the rate. On two occasions the city waived its franchise rights on the ground that the situation necessitated a temporary increase. As a result of this action the company raised its fares from 5 to 6 cents and later from 6 to 7 cents.

When a 10-cent fare was sought the Common Council refused to waive the franchise restrictions, instructing the corporation counsel to oppose the railway's petition. The commission has sustained an objection of the city of Rensselaer to the power of the commission to increase rates in that city.

Seven-Cent Fare Asked in Birmingham

Combined Railway and Light Properties Have Earned Slightly Less Than Bond Interest and Sinking Funds

Claiming that the railway department yielded a return of only 1.9 per cent upon its book value and of only 3.3 per cent upon its taxable value, the Birmingham Railway, Light & Power Company, Birmingham, Ala., filed a petition for the right to increase its fares from 6 cents to 7 cents before the Alabama Public Service Commission on Dec. 1. Judge William I. Grubb of the United States Court, now holding court in New York, granted permission to Receiver Lee C. Bradley to ask a 7-cent fare of the Public Service Commission, in a formal order issued at New York on Nov. 29.

IN his application made to Judge Grubb for permission to file his petition with the Alabama Public Service Commission Receiver Bradley has made a detailed report on certain phases of the company's finances and operating expenses. He declares that the combined properties have earned slightly less than bond interest and sinking funds during the receivership. The railway department, he states, is chiefly responsible for the deficit.

CASH DEFICIT OF $1,435,101

The condition of the receiver's estate on Nov. 1 showed a cash deficit of $1,435,101. This does not include $179,203 advanced by the city for the new track and paving on Tuscaloosa Avenue; or about $210,000 advanced by Sloss-Sheffield Steel & Iron Company for the construction of the new by-products gas main; or $49,518 advanced by electric consumers for extension to be repaid from future earnings. They are, however, all obligations of the receiver.

The only obligations resting upon the estate of either company which have been actually paid by the receiver, with the exception of $67,029 of preferred operating accounts incurred shortly prior to receivership and wages and salaries of employees then accrued, have been the interest and sinking funds on the mortgage bonds. The combined properties have earned slightly less than bond interest and sinking funds during the receivership.

The railway department is chiefly responsible for the deficit as shown on the receiver's cash statement. Up to Sept. 4, 1919, this department operated with a 5-cent fare. On that date a 6-cent fare became effective.

BIG ADVANCE IN WAGES

On Sept. 1, 1919, a very large increase in the wage scale of trainmen and shopmen became effective by virtue of a contract between the receiver and the Amalgamated Association. The term of this contract is three years and the wage scale is uniform throughout the term. The increase in wages to trainmen and shopmen was immediately followed by a corresponding increase in the wages of practically all other employees. These increases, in the opinion of the receiver, must remain in effect for a considerable time. They more than absorbed the increased revenue resulting from the 6-cent fare.

For the period of one year, beginning Nov. 1, 1919, and ending Oct. 31, 1920, the operation of the railway department resulted as follows:

Gross revenue		$3,012,263
Operating expenses	$2,279,106	
Taxes and license (50 per cent of total)	184,247	
Renewal and replacement reserve (50 per cent of total)	230,157	
*Tidewater rental	75,000	
*Tidewater operating deficit for the period	7,555	2,776,066
Net operating income		$236,196

*Interest on the Tidewater bond is in its practical effect a rental, and it is so treated in the operating statement shown.

Only 50 per cent of the total taxes, license and renewal and replacement reserve is allocated to the railway department, although both the book value and the state tax assessment show a somewhat higher percentage of the entire property in the public service invested in the railway department.

NET OPERATING INCOME $807,465

The net operating income of the entire property for the year was $807,465, which is an annual return at the rate of 7 per cent on a total value of only $11,535,200. The book value of the entire property of the company is $24,090,421. The total net operating income for the year yielded a return on the total book value of only 3.3 per cent. Assuming the railway to represent one-half of the total investment, the net operating income from the railway department yielded a return of only 1.9 per cent on its book value and of only 3.3 per cent on its taxable value.

The only relief in the way of rates which the receiver has realized has been the increase of 1 cent in the railway fare, producing an increase in total gross revenue of approximately 7½ per cent, but material improvements have been made in the service and in the physical condition of the property.

These are all facts recited by Mr. Bradley, the receiver, in his appeal to the court. This appeal Mr. Bradley concluded as follows:

> Immediate relief by increase of income is imperative. It is obvious that this relief should come through the railway department. It is not, however, the purpose of the receiver at this time to present the question of a permanent valuation or fair return thereon.
>
> Your receiver is advised that the Alabama Public Service Commission is now clothed with plenary power to fix rates and fares.
>
> Wherefore, your receiver prays that he may be authorized to apply to the Alabama Public Service Commission for a railway fare of 7 cents, applicable to each of the fare zones, with such modifications and exceptions as may be deemed necessary, and that the receiver shall put into effect such increased fares as the Alabama Public Service Commission may order.

The matter was taken up promptly with the City Commission by Mr. Bradley and J. S. Pevear, general manager. Following the announcement of Judge Grubb's order and the formal application to the Alabama Public Service Commission conferences were held by the City Commission. It is probable that within a few days resolutions will be adopted by the City Commission declining to agree to any raise in present rates and holding that a 6-cent car fare is adequate. It is contended by members of the City Commission that prices are coming down and that as prices of materials and labor drop still further a 6-cent fare will yield an adequate return. Just what effect the present petition will have upon the reorganization plan upon which the City Commission and officials of the company have been at work has not been stated by either side since the issuance of the court order.

Service Record in Fort Wayne

Sixty-one new cars have been placed in service on the city lines of Fort Wayne, Ind., during the past three years, according to a recent statement of Robert M. Feustel, president of the Indiana Service Corporation, formerly the Fort Wayne & Northern Indiana Traction Company. Ten of the cars are of the light-weight double-truck variety and fifty-one are of the one-man safety type. The total cost of this equipment was $380,000.

Mr. Feustel called attention to the fact that while many companies were cutting expenditures the Fort Wayne system increased the total number of cars in service by fifteen. In 1917 the railway operated thirty-four cars on the base schedule and forty-six in rush hours. Eighteen of the near-side cars were used, the remainder being side bench, closed cars. The one-man car was in its earliest stages of development at that time and more equipment was urgently needed in Fort Wayne. Ten modern light-weight double-truck cars were therefore purchased by the company at that time for $7,500 each.

More cars were needed, and men were becoming scarce. The first order for sixteen one-man safety cars was at a price of $5,100 each. A year later thirty-five such cars were purchased for $6,400 each. In the spring of this year the railway asked for bids on twenty-five additional cars, and the price had jumped to $9,400 each. This was $1,900 a car more than was paid for double-truck cars in 1917. Because of insufficient revenues the company was unable to purchase this additional equipment.

Mr. Feustel, in summing up the situation, referred to the railway's inability to purchase additional equipment at this time. He outlined the company's plans as follows:

> We could not stand the $9,400 price and consequently the use of the old cars for industrial trippers and of every new car, both double-truck and one-man, and rebuilt near-side cars in regular service, is our plan for this winter. That is why we know that the service will be right.

Losing $2,000 a Day

New York State Railways Asks Commission for 10-Cent Fare in Syracuse—Service Cut

Unable to secure financial relief from the city authorities of Syracuse, N. Y., the New York State Railways has appealed to the Public Service Commission for the Second District for authority to charge a fare of at least 10 cents on Syracuse lines. This action follows the rejection by the Syracuse Common Council of a proposition for a service-at-cost franchise. The flexible-fare plan was turned down by the Council on Nov. 30, as announced in the issue of Dec. 4, page 1162. The present fare in Syracuse is 6 cents.

CITY PROTESTS SERVICE CUT

Corporation Counsel E. H. Lewis has filed with the commission a complaint against the curtailment of service by the railway. Immediately following the rejection of the service-at-cost plant B. E. Tilton, vice-president of the railway, announced a drastic cut in service and the elimination of all but a few "owl" cars. The city's complaint alleges that the company has put into operation a schedule which reduces car service 21 per cent.

In its petition the company states that the maximum rates now charged on its Syracuse lines are insufficient to yield a reasonable return and are unjustly and unreasonably low. It refers to the appointment of a commission by Mayor Farmer for the purpose of investigating and reporting upon the local railway situation. This commission made a unanimous report to the Mayor on Sept. 17, but the Common Council has refused to accept the recommendations.

The company further states that an arbitration board on July 1 granted its employees an increase in wages of 33⅓ per cent, retroactive to May 1. It is alleged that since the award was made the company "is losing upward of $2,000 per day in an effort to furnish adequate service at the present rate of fare." It is contended that if the present rate of fare and present wage scale were applicable throughout the year 1920 the operating loss alone to the railway would be $112,134, this being without any allowance whatever for return upon the value of the property, surplus or contingencies.

DIFFER ON VALUATION

During the past few years several independent valuations of the Syracuse lines have been made. The report of McClellan & Campion, employed by the company, shows the following value of the property used in the public service in the Syracuse district on June 30, 1920: Based on present-day prices, $21,012,201; based on average prices, 1915 to 1919, $16,663,300; based on pre-war prices, $12,006,134. The report of Ford, Bacon & Davis, employed by the city, shows the fair value on June 30 last to be $12,415,000. For the year ended Dec. 30, 1919, the company received a return of only $1,694,681, and for the first eight months of 1920 of $608,833, although the full wage increase was not included in the costs of operation for that period.

Taken in conjunction with the increase in wages a 10-cent fare is expected to yield a fair return on a valuation of $12,732,655.

Milwaukee Prepares for Increased Service

Deliveries of the 100 new cars which the Wisconsin Railroad Commission on Oct. 30, 1919, ordered the Milwaukee Electric Railway & Light Company to place in service by Nov. 1, 1920, will probably be started next February, according to a letter to the commission from John I. Beggs, president of the company. Mr. Beggs declared that the charges recently made by Commissioner John S. Allen of the Wisconsin Commission that the Milwaukee Electric Railway & Light Company had "flagrantly disobeyed" the commission's order for new cars were unjustified. He points out that labor troubles and other causes beyond the control of the company had seriously retarded the delivery of the cars. The cars are to be double-truck, light-weight cars designed for either one-man or two-man operation.

The Milwaukee Electric Railway & Light Company, according to Mr. Beggs, will be in a much better condition than ever before to take care of the coming holiday travel. It is now operating 587 cars, and expects to have twenty-four more, largely from Racine and Kenosha, where safety car operation was recently instituted. In addition there have been added 648 more seats—the equivalent of sixteen cars—by remodeling equipment in use. For the first time in several years also the company is able to operate with a full force of men. It will have at congested corners a large number of front-end collectors to facilitate the loading and movement of cars, especially in rush hours.

Utah Interurban Asks Increase

An application for increased passenger fares has been filed with the Public Utilities Commission of Utah by the Salt Lake & Utah Railroad, an electric interurban road running between Salt Lake City and Payson, Utah. It is claimed by the company that for an electric railroad to charge lower rates than a steam railroad on passenger traffic between the same points is in violation of the state public utilities act. The company asserts in its petition that, while the rates it asks would not equal those now charged by the Denver & Rio Grande and the Salt Lake Route, the increases sought would minimize the discrepancy.

The company is asking for a one-way rate of 3.60 cents a mile; for a round trip rate of 3.42 cents; for commutation tickets at the rate of 2.64 cents; for school tickets at the rate of 1.70 cents; for 1,000-mile mileage books at the rate of 2.70 cents, and for 500-mile mileage books at the rate of 3 cents.

In petitioning for the increased rates the company asserts that in spite of some increases already permitted by the commission, the railway finds itself with insufficient revenue; that the increases asked would still give a return to the company less than it claims is a fair return, but would afford substantial relief; that the one-way fares have never been increased by the commission, and that its passenger traffic is not bearing a fair proportion of the cost of the service to the public.

After the Auto Driver

National Safety Council Hopes to Teach Motor Vehicle Operators the Need of Exercising Caution

The 8,000 industrial organizations, trade associations and governmental agencies comprising the National Safety Council have just undertaken the biggest job attempted by the council during the eight years of its existence—to teach the fundamentals of safe driving and motor vehicle maintenance to every motor truck and passenger car driver employed in industry, whether or not his employer is a member of the council. The purpose of the undertaking is threefold:

1. To reduce so far as possible the number of fatalities resulting from automobile accidents, these now approximate 15,000 a year. One person is killed by an automobile every thirty-five minutes.
2. To save for industry and the public at large the millions of dollars lost each year through property damage resulting from automobile accidents. This loss amounts to $500,000 a year in a city of about 500,000 population.
3. To save for industry some of the many millions of dollars now paid out annually for compensation, medical attention, lost time and damage for personal injuries resulting from automobile accidents.

The National Safety Council through its forty local councils has for several years carried on a campaign against jay walking and other forms of carelessness on the part of pedestrians. But it has discovered in this campaign that while the pedestrian is responsible for a large percentage of accidents, at least an equal percentage of automobile accidents is due to ignorance of the safe methods of motor car driving or maintenance on the part of the drivers of commercial vehicles.

The council, with the aid of automobile manufacturers, automobile driving instructors, automobile traffic managers, repair men and the representatives of practically every industry interested in any phase of the automobile accident problem, conducted a nine months' study of the causes of accidents and means of eradicating those causes. This study has just been completed and the findings published by the council in the form of a set of twelve safety bulletins and lessons for automobile drivers.

Transportation News Notes

Grants Higher Newspaper Rates.—The Ohio Public Utilities Commission has granted the Ohio Electric Railway, Springfield, and the Dayton & Troy Electric Railway, Dayton, an increase of ¼ cent a pound on newspapers carried by them. The old rate was ½ cent a pound. Application was made to the commission for permission to increase the rate to 1 cent, but this was refused in favor of a rate of ¾ cent a pound.

Dairy Rates Stand.—Three interurban companies operating in Indiana, the Terre Haute, Indianapolis & Eastern, the Indianapolis & Cincinnati and the Union Traction, were recently authorized by the State Public Service Commission to continue indefinitely their existing rates on milk, cream and dairy products. Without the commission's order, the rates would have been reduced to the old levels on Dec. 31.

Interurban Fares Advanced.—The Public Service Commission for the Second District of New York has granted the Empire State Railroad, Syracuse, N. Y., permission to charge 3 cents a mile for cash fares on its line between Syracuse and Oswego. Commutation rates are advanced to a basis of 1⅝ cents a mile. The fare has been 2.77 cents for cash and ticket fares and 1½ cents for commutation fares. The new rates took effect on Dec. 1.

"Safety Week" for Capital.—Washington, D. C., is to have a city-wide safety campaign, to be initiated with a "safety week." The suggestion for the undertaking came from the Washington Railway & Electric Company. The movement now embraces practically every activity in the city, but the two traction systems, the Washington Railway & Electric and the Capital Traction, are leading the campaign. The street cars are to carry both inside and outside slogans calling attention to the need for care on the part of all persons using the streets.

Kansas City Fare Extended.—The Missouri Public Service Commission has granted the receivers of the Kansas City Railways six months from Nov. 20 in which to charge the present rates of 8 cents for a single trip fare. Although the company before it passed into the hands of the receivers had an application pending asking for an increase in existing rates, supposed to be for a 10-cent fare, the receivers did not ask to have this application considered, but only to have the present rates continued until they had had ample time in which to familiarize themselves with the finances of the company.

Fares Raised, Strike Ends.—To meet the demands of its employees for an increase in wages the Clinton (Iowa) Street Railway on Nov. 23 raised its cash fare from 5 cents to 6 cents. The men had gone on strike to force the company to increase their wages to 75 cents an hour. The management agreed to pay the men 60 and 65 cents an hour. The new fare rate provides for the sale of nine tickets for 50 cents. Passengers will receive a refund slip with each cash fare, pending permanent settlement of the fare situation. The city authorities recently refused to allow the company to raise its cash fare to 7 cents.

Bus Company Organized.—A certificate of incorporation was filed recently with the Maryland Tax Commissioner organizing and incorporating the Shore Transit Company, with main office at Salisbury. The incorporators are A. M. Jackson, Mark J. Cooper and B. J. Jackson, all of Salisbury. The authorized capital is placed at $75,000 to be issued in common stock at $100 per share. It is understood the bulk of the stock will be subscribed by business interests of Baltimore. The purpose of the Shore Transit Company is to operate a fleet of passenger buses between Elkton and Salisbury, connecting with the lines at Easton and Chestertown and the ferries at Rock Hall and Clairborne.

Congestion Greater in Dallas.—The City Plan Commission of Dallas, Texas, has proposed that interurban cars entering Dallas be so routed into and out of the terminal on Jackson Street that they may be taken off of Commerce and Main Streets This proposition is advanced as one of the best solutions of the traffic problem, as it is maintained that the presence of interurban cars on Main and Commerce Streets is one of the chief causes of congestion. The project involves not only the re-routing of interurban cars, but the relocating of the interurban terminal. The new interurban station in Dallas, while one of the finest in the South, is rapidly becoming inadequate to accommodate the traffic, and the need for a larger station will soon become imperative, in the opinion of the commission.

Rubber Slump Reflected in Akron Fares.—During the month of November, 1920, the average number of revenue passengers carried daily on the city lines of the Northern Ohio Traction & Light Company in Akron, Ohio, was 115,847, as compared to 141,984 in November, 1919. On a 5-cent fare basis this loss of 26,137 daily passengers represents a daily money loss of $1,306, or at the rate of $477,000 a year. This condition reflects directly the great slump in the rubber-tire business, the difficulty of which may be appreciated by the knowledge that the price of raw rubber dropped with extreme rapidity from $3.50 a pound to 26c. a pound. On top of this enormous shrinkage in stock inventory the tremendous orders from automobile manufacturers virtually have been cut off. The tire manufacturers were thus caught at both ends.

Personal Mention

W. L. Goodwin Speaks

Successful Organizer of Electrical Industry Outlines His Co-operative Plan at C. E. R. A. Meeting

A feature of the meeting of the Central Electric Railway Association at Indianapolis on Dec. 2 was an address on "Co-operation," by William L. Goodwin of the General Electric Company. Mr. Goodwin has achieved a national reputation in the central stations and electric supply fields for the work which he has accomplished in crystallizing public opinion in behalf of constructive measures. This was the first occasion upon which Mr. Goodwin had addressed an audience of electric railway men. He urged his hearers to forget petty grievances and to adopt a spirit of conciliation toward the public, and stressed the importance of good-will in the rendering of efficient service.

The "Goodwin plan," as outlined at the Indianapolis meeting, consists of a campaign of education, conducted principally through the medium of newspaper publicity and other channels to co-ordinate the various interests in the industry, and to bring them together in harmonious action. It aims to "inspire every man in the electrical industry, whatever his rank, job or title, with an appreciation of the responsibility now before us, and the responsibility upon every electrical man to help 'put across' this great job of the electrification of households, shops, factories, and transportation systems, thereby increasing, as is possible in no other way, production, for human efficiency and comfort."

THE GOODWIN PLAN IN OUTLINE

Mr. Goodwin has been eminently successful in working out his idea in his own business and in the electrical industry as a whole. His plan is based on the premises that:

Each individual owes a responsibility to the organization representing his branch of the industry.

The organization owes a similar responsibility to its members.

Each organization representing each branch of the industry owes a responsibility to all other organizations in the industry, to the end that all problems may be discussed, having in view the interest of all, thereby providing a basic plan for more adequately and effectively serving the American public.

Mr. Goodwin is a native of San Francisco. In 1901 he became the representative in that city of the Western Electric Company. Four years later he resigned to organize a jobbing business for himself. He subsequently organized the Pacific States Electric Company, with offices in the principal cities of the Coast states. He kept hammering away at his co-operative idea, contributing greatly to the development of the electrical business of the Coast. Other work which he did in California at this period in the way of organizing included an organization in 1900 of the fruit growers of the state, and in 1915 of the motion picture industry. In 1916 he was invited to go East to explain his ideas on co-operation to the rest of the industry.

C. E. Brown Steps Up

General Manager of the San Francisco, Napa & Calistoga Railway Appointed Vice-President Also

C. E. Brown, general manager of the San Francisco, Napa & Calistoga Railway, Napa, Cal., has been promoted to be vice-president of that system. Mr. Brown will continue to serve as general manager. The railway operates city and interurban lines connecting San Francisco with Valejo, Napa and other towns.

C. E. BROWN

Mr. Brown took charge of this property in November, 1915. Under his supervision the road has been managed economically and to the satisfaction of the owners. Its facilities have been developed by the building of several extensions which have secured for it a freight traffic of considerable proportions. It has extended its lines to connect with those of the Government operating in the Mare Island Navy Yard, and is now handling all freight to and from the yard. An interchange freight yard, with a capacity of seventy-five cars, has been built jointly with the Southern Pacific Company.

Mr. Brown was born in New York City, Sept. 4, 1882. He was educated in the public schools of New York and Ohio, later attending the Fayette Normal University of Ohio and the Central College of Indiana. From the latter institution he received the degree of Bachelor of Science. His first employment was with the Baltimore & Ohio Railroad in the car department. He remained with that company for three years as repairer, piece-work inspector, inspector and foreman. In 1905 he went with the Chicago, Rock Island & Pacific Railroad, working on air brake equipment and installing the Loree system of accounts on the Colorado Division. In 1908 he joined the Atchison, Topeka & Santa Fé, Albuquerque Division, where he was employed as bonus timekeeper and bonus inspector. He also assisted in installing the bonus system of pay on that division of the Santa Fé system.

In the latter part of 1909 Mr. Brown entered the electric railway field with the Chicago & Milwaukee Electric Railroad (now the North Shore) in the shops and stores department. He was later transferred to the general office. A. W. McLimont, now vice-president of the Winnipeg Electric Railway, was then in charge of this property. When Mr. McLimont left to take the position of vice-president and general manager of the Michigan United Railways late in 1910, Mr. Brown was selected by him as his assistant and remained at Jackson, Mich., as assistant general manager for about three years. He then went with Mr. McLimont to Atlanta, Ga., where he had charge of purchases for the Tallulah Falls hydro-electric development of the Georgia Railway & Power Company.

L. C. Gilman Leaves Electric Railway Field

L. C. Gilman, president of the Oregon Electric Railway and the United Railways, Portland, Ore., has been elected vice-president of the Great Northern Railway, with headquarters in Seattle, Wash. Mr. Gilman was born at Levant, Mo., on Jan. 28, 1857. He was educated at the Maine Central Institute at Pittsfield, Me., from which he was graduated in June, 1879, and at the law school of Columbia University. He entered railway service in October, 1903, as Western counsel of the Great Northern Railway, with headquarters in Seattle.

In February, 1909, he was made assistant to the president of the Great Northern, with headquarters at St. Paul, Minn., where he served until June 1, 1914. He was then elected president of the Spokane, Portland & Seattle Railway and its subsidiary lines, including the Oregon Electric Railway and the United Railways. In June, 1918, Mr. Gilman was appointed director of the Puget Sound district, comprising the states of Oregon and Washington, by the United States Railroad Administration. He served in this position throughout the period of federal control. On Nov. 1 last Mr. Gilman resigned as president of the Spokane, Portland & Seattle and its subsidiaries to enter upon his new duties as vice-president of the Great Northern and removed to Seattle.

A. C. Bounsall has been appointed safety agent of the Anderson Division of the Union Traction Company of Indiana, Anderson, Ind. Mr. Bounsall is storekeeper of the division.

Foster Ash has been appointed freight agent of the Monongahela Valley Traction Company, Fairmont, W. Va. Mr. Ash succeeds O. J. Flowers, who has been promoted to general inspector of the company. Mr. Ash was formerly assistant freight agent.

J. B. Shaedel, who for several years has been connected with the Union Traction Company of Indiana, Anderson, Ind., has resigned. Mr. Shaedel has accepted a position as superintendent of the municipal light and power station of Columbia City, Ind., and has entered upon his new duties.

Manuel V. Domenech has been made general manager of the Porto Rico Railway, Light & Power Company, San Juan, Porto Rico. In a previous statement concerning Mr. Domenech's election his name was incorrectly spelled. Mr. Domenech succeeds E. M. Sewell, resigned.

M. E. Graston, freight claim agent of the Union Traction Company of Indiana, Anderson, Ind., has been granted a leave of absence and is spending the winter in Florida. During Mr. Graston's absence W. G. Cooper is acting as freight claim agent of the company.

John Kenish, who for several years has been connected with the Missouri Public Service Commission, has been appointed a special master in chancery to handle matters involving the receivership of the Kansas City Railways. Mr. Kenish, immediately after his appointment, resigned from the commission and on Dec. 1 qualified for his new duties.

D. J. McGrath, who recently resigned as assistant to the president of the Mobile Light & Railroad Company, Mobile, Ala., is now engaged in special editorial work for the ELECTRIC RAILWAY JOURNAL in connection with the preparation of the annual statistical issue. Prior to the war he was engaged as special assistant to M. C. Brush, then president of the Boston Elevated Railway. Upon his return to civil life in the spring of 1919 he was made assistant to the president of the Mobile Light & Railroad Company.

Frederick D. Gordon has been appointed general manager of the Cumberland County Power & Light Company, Portland, Me. Mr. Gordon succeeds A. H. Ford, who resigned more than a year ago. Since the resignation of Mr. Ford the company has been without a general manager, the heads of the several departments having supervision of the work. Mr. Gordon was formerly general manager of the Androscoggin Electric Company, Lewiston, Me. He resigned his position at Lewiston last August to accept a position with the Portland company, after being connected with the Androscoggin system for a number of years as general manager.

C. Thorburn Promoted

Succeeds I. L. Ward as General Purchasing Agent of the Pacific Electric Railway—C. C. Fenimore Advanced

C. Thorburn has succeeded I. L. Ward as general purchasing agent of the Pacific Electric Railway, Los Angeles, Cal., Mr. Ward having resigned to become general manager of the Steel Mill & Foundry Supply Company, with headquarters in Los Angeles. C. C. Fenimore has been appointed Mr. Thorburn's successor as general storekeeper of the railway.

Mr. Thorburn began his training in the Southern Pacific shops at Ogden, Utah, in May, 1902, as a car cleaner. He remained with the Southern Pacific at Ogden in various positions, first in the shops, then in the engineering department, and, still later, in the stores department. In August, 1905, he became storekeeper of the Oregon Short Lines, at Sparks, Nev. Here he remained until June, 1907, when he went to Los Angeles and became a member of the stores department force of the Southern Pacific. He was subsequently promoted to stores accountant.

C. C. FENIMORE

In May, 1909, he joined the Pacific Electric as an accountant in the auditor's office. In December of the same year he was appointed general storekeeper of the railway. He served during the war as a member of the Engineers Corps, Railway Operating Troops in France. In July, 1919, upon his discharge from military service, he returned to the Pacific Electric as general storekeeper.

Mr. Fenimore was born in Economy, Ind., on May 4, 1884. He was graduated from the Economy High School in 1901. Five years later he entered railroad work as a boilermaker's helper for the Southern Pacific Company in Sparks, Nev. He was subsequently transferred to the stores department, where he served successively as counter boy, shipping clerk, price clerk and chief clerk to the division storekeeper. In 1909 Mr. Fenimore went to Los Angeles, where he accepted a position with the Pacific Electric as price clerk in the general storekeeper's office. With the transfer of accounting of that department to the auditor's office he became an accountant in that division. Here he successively held the positions of chief clerk in charge of store and mechanical accounts, and head clerk of disbursement in charge of store, mechanical, roadway and disbursement accounts.

Mr. Fenimore was transferred to the purchasing department in December, 1917, as chief clerk to the general purchasing agent. He has since held this position, with the exception of a period from September, 1918, to July, 1919, when during the absence of Mr. Thorburn he served as acting general storekeeper.

Obituary

Owen M. Dean, at one time president of the Carondelet Railway, St. Louis, Mo., one of the fourteen companies absorbed when the present United Railways was organized, died on Dec. 4. Mr. Dean was eighty-two years of age. He came to America when a boy.

Ward Baldwin of Cincinnati, Ohio, who built the line of the South Covington & Cincinnati Street Railway, Covington, Ky., died recently in Cincinnati. Mr. Baldwin designed all the mechanical and electrical equipment that will be used in the new subway entering Cincinnati. In 1915 he completed the valuation of the Cincinnati Traction Company's property. He was a director of the Engineering Club of Cincinnati and a member of the American Society of Civil Engineers, and had formerly been professor of civil engineering at the University of Cincinnati, where he was largely instrumental in founding the Department of Engineering.

George S. Rice, a civil engineer and at one time chief engineer of the New York Rapid Transit Commission, died on Dec. 7 at his home in Montclair at the age of seventy-one years. Mr. Rice became identified with rapid transit construction in 1887 as chief engineer of the Boston Transit Commission, and later, in 1904, he was chief engineer of the New York commission. Mr. Rice spent several years prior to 1900 making studies for the subway project in New York City, and he not only served under the commission but remained in his position of chief engineer under the Rapid Transit Board. During the construction of the dual system, now operated by the Interborough Rapid Transit Company, Mr. Rice was in charge of the tunnel division and sections of the work in Brooklyn. When the so-called new Croton Aqueduct was placed under construction Mr. Rice became deputy chief engineer of that enterprise and remained on aqueduct construction until 1892. Since that time he had been identified with subway construction in New York.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Railway Buying Is Good

New England Reports Show Good Fall Orders—Prompt Deliveries Aid to Maintain Trade

Although there is nothing spectacular about the present buying of electric railway supplies it is going on steadily in a volume that is encouraging to more than one manufacturer. A New England representative of a number of leading specialties informed an ELECTRIC RAILWAY JOURNAL man this week that notwithstanding the ups and downs of general business, buying of supplies has continued well into the fall, the earlier months of which compare favorably with the purchasing of the first part of the year. The promptness with which orders are being filled is a valuable aid to trade. Thus, an order for 10,000 special malleable-iron castings placed a month ago was filled within thirty days, and improved shipping conditions are helping to reduce the ultimate cost of getting supplies to the consuming traction companies.

The relative steadiness of the demand for equipment, especially in connection with safety car parts, is most encouraging. Railway purchasing agents are buying conservatively, but they are seldom out of the market, and manufacturers prepared to give personal attention to service problems are sure to reap the reward of their efforts. It seems a truism to point out that as long as street car service continues supplies must be bought, but in the face of present general business conditions a recognition of these rather elementary points is worth while. This representative of manufacturers pointed out that on some products orders for two months' factory output are in hand, and actually the demand for some special supplies in the line of trolley fittings is so active that very little new business is being solicited at the moment. Through the field of railway equipment as a whole buying is cautious, but the stability of traction service as a public utility is proving week by week a factor tending toward confidence.

Insulating Materials Weak

Consumers' Supply Low, but Demand Is Lacking as Prices Decline—Deliveries from Stock

Current weakness in the market for insulation of all sorts apparently is felt by one manufacturer as much as another. Consumer demand is of the lightest hand-to-mouth variety, even repair shops now having ceased to buy. Electric railways, in spite of the imminence of winter bringing necessary repairs to equipment, are not as yet providing for their needs in such lines as tapes, varnished cloth, etc.

Foreign buying is as badly off as domestic demand, present exchange rates being largely held responsible. Reports are received that foreign competition is now starting to make itself felt. Samples of insulation material that are said to compare favorably with the product of home manufacturers have been received in this country with a view toward introducing them in the American market.

The general attitude of consumers at present is to await lower prices. Even some manufacturers are holding off buying raw material in view of the uncertain condition of the market. Stocks of finished insulation with large consumers are said to be low, however, and hence producers feel optimistic regarding a return to normal business before spring. At the factories inventories, though in ample shape to care for customers' current needs, are not very large, as the policy of manufacturers has been to avoid stocking high-priced material on a declining market.

Deliveries are about all that can be desired. Virtually all standard material can be shipped from stock, though how long this condition would obtain with a good volume of orders is a question. Prices have slumped considerably following the falling off in demand and lower raw material costs. Varnish gums, shellac, linseed oil etc., have eased off in price, consequently insulating paints and varnishes are lower. Spot cotton at this writing is quoted at 16¼ cents and the low levels of these materials have been reflected in a drop of from 15 to 20 per cent on varnished cambric and silk, and about 20 per cent on armature twines within the last month. Tapes, though not reduced by all manufacturers, are lower, and friction and rubber tape have dropped materially. On the other hand, paper insulating material has undergone no change, as the market for paper is still undersupplied.

Steel Rail Orders Taxing 1921 Output

Some Mills Already Booked to Capacity as Heavy Orders Are Placed —Traction Companies Advised Not to Delay Buying— One Independent Fixes Price at $57

Buying of steel rails is proceeding strongly and from present indications the rail mills of the country will be booked to capacity throughout next year. In fact, the mills of some companies are already completely booked up and will accept no further orders. Many of the independents still have considerable rolling capacity in reserve, however.

Consumers are anticipating their needs earlier than usual this year as it is stated that steam roads have either covered or are covering their 1921 requirements now. A press dispatch this week states that five lines alone have placed or are about to place orders totaling nearly 400,000 tons. Foreign buying is lacking, but this circumstance, which is largely due to financial conditions abroad and prevailing exchange rates, causes little or no concern. In fact, some of the leading rail interests are not encouraging foreign orders, because it is said that domestic needs will absorb the entire supply.

According to an article in the Dec. 2 issue of *Iron Age* the railroads of the country will need to buy about 4,500,000 tons of rails for each of the next five years to place them in normal operating condition. The estimated total production of rails in this country can only reach an annual total of about 3,500,000 tons of rails, however, leaving a shortage of a million tons of rails each year.

Orders for girder rails are being received in considerable volume, but not to the same extent as for standard T-rails. Suburban traction companies which use the latter class of rail on their roadbed are showing considerable interest in the market at present, especially in view of the strong competitive buying from steam roads. But on the whole electric traction companies seem to be inclined to hold off placing their 1921 requirements as large tonnages from that quarter are known to be still unplaced. Girder rail producers predict that they will be busy all through next year and are advising customers to cover their spring needs right now instead of waiting until January or February.

Unless this advice is heeded, it is pointed out, many lines will probably be left in the lurch on their spring construction programs. This especially applies to the smaller street car lines, as it is the policy of mills not to roll under 500 tons of girder rails, but to hold small orders until a sufficient tonnage accumulates. On the standard sections 1,000 tons would probably be considered too small an amount to roll. So far as can be learned, however, mills are not raising the tonnage limit for which they will roll an order. Nor are rail jobbers endeavoring to stock up with rails on the chance of obtaining a premium later on for quick delivery. On the contrary, rail dealers report a very quiet market at present.

Prices are still largely undetermined, but this does not seem to affect buying adversely as the price in most cases is left open. The market on girder rails for 250 tons or over is 3¼ cents per pound, or about $72 to $73 per gross ton. A leading independent interest has fixed its 1921 prices for standard T-rails at $57 per gross ton covering the first quarter, but other independents have not yet announced their schedule. The United States Steel Corporation has also not as yet announced its 1921 prices, which are expected to be made public this month.

Still Lower Quotations in Trolley and Bell Cord

Since last week's quotations on cotton trolley cord and bell cord were announced further changes have been made which brought the price still lower. This material may now be bought for as low as 66 cents a pound and from there on up to 85 cents, depending upon grade and manufacturer. Conditions of supply and demand have undergone no change.

Slight Recessions Found in Cotton Waste Market

Buying of cotton waste for traction purposes is only of a hand-to-mouth nature, and the same condition applies to the steam railroad field. Demand in general from all sources is extremely light, and under the conditions existing in the cotton mills the supply of waste is just about equal to this demand. Production of cotton goods from which the waste is gathered has fallen to low levels, in some cases hardly 50 per cent of mill capacity being under power.

Consumers appear to be waiting for the first of the year, at which time present contracts run out and dealers will make new contracts at what is felt will be considerably reduced prices. Cotton-waste prices have been holding steady for some time and it is just recently that any recessions have been reported. These have been in the nature of 1 to 2 cents a pound, which brings the present price to about 14 to 17 cents a pound in lots of 100-lb. bales.

Spain as a Market for Street Car Headlights

Street cars seldom have a headlight of an intensity greater than that required to give visible warning of their approach, says the Department of Commerce's special agents series No. 197 entitled "Electrical Goods in Spain." There are practically no interurban lines to need powerful lights, but there ought to be a small market for detachable lights of moderate capacity that would be more efficient than the stationary, built-in lamps now used. At the present time little or no interest is displayed in this equipment by the traction systems, but there are already a number of modern headlights in daily service, so the opportunity is there.

Strong Foreign Demand for Steel Towers

Domestic Demand Greater Than Ever Before Predicted Because of Big Power Projects on the Books

Largely as a result of adverse financial conditions which have made the floating of bonds for financing power extensions very difficult, domestic interest in steel transmission towers remains lacking. Foreign orders and inquiries, on the other hand, are extremely active. Even there a large producer who had a good volume of foreign business on hand three months ago reports that since then, with the exception of inquiries from wireless interests, demand has petered out. Several other producers report no slump in export business as yet, however.

Some of the most promising countries affording markets for transmission towers are Italy, France, Japan, South America and the Scandinavian peninsula, orders being reported both on behalf of power companies and electric railways. One important factor in the increase of this demand abroad is said to be the growing scarcity of fuel and oil in certain European countries, which has led to the more intensive development of natural water-power resources.

On the other hand a great deal of export business is undoubtedly held in abeyance at present because the present level of foreign exchange works so strongly against foreign customers who buy in the United States. With any decided change for the better in that respect and an improvement in financial conditions at home as well it is believed that the demand for transmission line equipment will mount to greater proportions than ever before. This view is based on the extent and number of hydro-electric power and railway projects that are known to be on the boards, both at home and abroad.

Conditions of production are greatly improved. This is largely due to the relief from transportation congestion which delayed supplies of raw material for so long. Little difficulty is now experienced in obtaining all the steel that is needed, and both the supply and the efficiency of labor have improved. Deliveries are consequently much improved, but as the greater part of this product is fabricated to order shipments vary according to the manufacturer, the size of order and the type of material —whether galvanized, etc. In general delivery of about 1,000 steel towers in the slowest instance can be accomplished in six to seven months and in the quickest in about four to five months.

In spite of the view taken by one large producer that lower quotations will not prevail for a long time several other manufacturers see a gradual softening of prices that will come about as a result of the lower levels quoted by independent steel producers.

Rolling Stock

The Austin (Tex.) Street Railway Company will purchase ten new cars of the latest type.

The Princeton Power Company, Princeton, W. Va., owner of the Bluefield street car system, has ordered five cars which it expects to arrive in time to be placed in service about the first of the year.

Detroit United Railway, Detroit, Mich., announces that at least sixteen of the seventeen new front-entrance, side-exit, type 777 cars now under construction in the company's shops should be in service by Jan. 1. Delivery of the ten safety cars which were being built for the company by the American Car Company of St. Louis was expected on Dec. 1. Fifty trailers, also being built by the St. Louis Car Company, will probably not be delivered before next March, it is said.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., expects delivery of ten new Birney-type safety cars from the factory at St. Louis for its Terre Haute division soon. These cars were ordered last spring but delivery has been delayed several months. They will be put into service immediately, part of the consignment on Wabash Avenue to replace the old type cars in service there and the remainder on other lines to allow some of the cars now in use to be overhauled.

The Detroit (Mich.) Municipal Railway, mentioned in the Nov. 13 issue as purchasing twenty-five safety cars, has specified the following equipment on these cars:

Number of cars ordered	25
Date of order	Nov. 16, 1920
Delivery	45 Days
Builder	Osgood-Bradley
Type	Safety
Seating capacity	32
Weight, total	16,000 lb.
Length over all	28 ft. 0¼ in.
Truck wheelbase	8 ft. 0 in.
Width over all	7 ft. 10⅝ in.
Interior trim	Cherry
Roof	Arch
Air brakes	Westinghouse
Axles	Forged Carbon Aera E-2
Bumpers	Mfr's Standard
Car signal system	Nichols-Lintern
Control	K63
Curtain fixtures	Nat'l Lock Washer, Curtain Supply
Curtain material	O'Bannon Diced D. Coated Color
Designation signs	Keystone
Fenders or wheelguards	H. B. Wheel Guard
Heater equipment	Peter Smith
Headlights	O. B.
Lighting fixtures	E. S. Supply Co. No. 25702
Lightning arresters	G. E.
Motors, type and number	G. E. 264
Paint, varnish or enamel	Sherwin-Williams Old Dutch
Seats	Mfr's Standard
Snow scrapers	Root, Air Operated
Step treads	Mason
Tail lights	Nichols-Lintern
Trolley catchers or retrievers	O. B.
Trolley base	O. B.
Trucks	Mfr's Standard
Wheels (type and size)	26-in. Forg. Steel

Track and Roadway

Indiana Service Corporation, Fort Wayne, Ind.—R. M. Feustel, president of the Indiana Service Corporation, has notified the city officials of Fort Wayne, Ind., that his company will extend its tracks on Columbia Avenue to Anthony Boulevard as soon as a proposed new bridge is completed over Delta Lake, which now marks the terminal point of the Columbia Avenue line. It is expected that this bridge will cost about $10,000, half of which will be paid by the board of park commissioners and half by special assessment.

Delta Light & Traction Company, Greenville, Miss.—The improvement program of the Delta Light & Traction Company will include an entire new track on the East End line to Washington Avenue and two new cars will be put into service on this line. The work of rehabilitating the Greenville street railway under an agreement between the city and the Delta Light & Traction Company will cost about $100,000.

Minneapolis (Minn.) Street Railway.—The Minneapolis Street Railway has put into commission a new loop and a new short cut to the North Side, giving that section of the city better transportation to the business district and lessening the trolley traffic on Hennepin Avenue. This new loop connects with a line built across the new Third Avenue bridge to the East Side, and a new Interurban line loop in use for the last two months.

New Jersey & Pennsylvania Traction Company, Trenton, N. J.—Although the City Commission of Trenton, N. J., has instructed City Counsel Charles E. Bird to apply to the Board of Utility Commissioners for an order compelling the New Jersey & Pennsylvania Traction Company to move its tracks on West Hanover Street, Trenton, to the right side of the street and to repair that section of the street, City Counsel Bird will not apply to the commission until the New Jersey Supreme Court has decided whether the old or the new utility board shall function.

Dallas (Tex.) Railways.—The Dallas (Tex.) Railways announces completion of track improvement and paving on Jefferson Avenue from Lancaster to Polk, a distance of about 2 miles, at a cost of $197,000. The work has been under way for more than a year, but has been delayed on account of shortage of crushed stone, asphalt and other paving materials.

Central Texas Electric Railway, Waco, Tex.—John Maxwell of Waco, Tex., has been appointed receiver for the Central Texas Electric Railway, recently organized in Waco for the purpose of building an interurban line from Waco to Temple. The receiver was appointed by Judge H. M. Richey of the Seventy-fourth District Court on petition of E. H. Bruyers, Waco, who alleged that the company is indebted to him in the sum of $4,800 and that it is insolvent. The traction company recently awarded contract for the construction of the first 6 miles of the line to the Central Texas Construction Company, organized as a subsidiary of the traction company.

Mesaba Railway, Virginia, Minn.—The Mesaba Railway has started the laying of tracks along the new right-of-way about 2 miles from Chisholm. This new line, which will extend to Hibbing, Minn., is under the direction of engineers of the Oliver Iron Mining Company. Four miles of track remain to be laid.

Seattle (Wash.) Municipal Railway.—The City Utilities Committee has approved a plan to extend the Alki car line to Douglas Place, one-fourth of a mile distant, at an estimated cost of $15,000.

Power Houses, Shops and Buildings

Boston (Mass.) Elevated Railway.—The trustees of the Boston Elevated Railway have filed a petition asking the 1921 Legislature to authorize the expenditure of $4,421,000 for new shops to be located at Everett and for additional power facilities.

Trade Notes

The M. B. Austin Company announces its removal on Dec. 1 to its own new building at 108-116 South Desplaines Street, Chicago.

Metal & Thermit Corporation, New York City, has opened a branch office at 141 Milk Street, Boston, Mass., in charge of Robert L. Browne, New England district manager.

Heyl & Patterson, Inc., 51 Water Street, Pittsburgh, manufacturer of elevators, hoists, etc., has awarded contract for the construction of a two-story bulding to cost about $60,000.

The Chase Turbine Manufacturing Company, Orange, Mass., has recently established a new sales office at Portland, Me., in charge of Albert M. Dexter, manager.

Taylor-Wharton Iron & Steel Company, High Bridge, N. J., announces that Henry F. Pratt has been appointed Mid-Western sales manager of the company and its subsidiaries, with offices at 502 Denham Building, Denver, Col.

The American Di-electrics, Ltd., 95 Liberty Street, New York City, announces the appointment of E. A. Thornwell, 1026 Atlanta Trust Company Building, Atlanta, Ga., as agent for the Southern States.

The C. M. Sorenson Company, 177 East Eighty-seventh Street, New York City, manufacturer of electrically driven air compressors, etc., has filed notice of increase in capital stock from $30,000 to $200,000.

The Chase-Shawmut Company, Newburyport, Mass., announces that approval by the Underwriters' Laboratories, Inc., has been given on the company's 600-volt line of renewable fuses to supplement approval of the 250-volt line.

The Simplex Wire & Cable Company, 201 Devonshire Street, Boston, Mass., has announced that the E. S. Stickle Company, 305 Union Arcade Building, Pittsburgh, Pa., is representative of the company in Pittsburgh, succeeding the Stickle & Taylor Company (dissolved).

The Safety Car Heating & Lighting Company and the Pintsch Compressing Company announce the removal of their general offices to the new plant located at Dixwell and Putnam Avenues, New Haven, Conn. The exceutive offices and sales office for the northeastern district will be located at 2 Rector Street, New York City, as heretofore, but the Jersey City office will be discontinued.

Dunbar Manufacturing Company, Chicago, Ill., manufacturer of various railway appliances, announces that its corporate name has been changed to the Morton Manufacturing Company, with H. U. Morton, president; H. H. Schroyer, vice-president, and Charles D. Morton, secretary-treasurer. The factory and general offices are situated at 5133-39 West Lake Street, Chicago, and sales representatives are located in Detroit, Cleveland, New York, St. Louis, St. Paul, Portland, Ore.; San Francisco, Chicago, and Sheffield, England.

Mitchell-Rand Manufacturing Company, New York City, manufacturer of insulating material, has concluded arrangements whereby the company will handle and stock the products of the Irvington Varnish & Insulator Company for eastern territory at mill prices.

New Advertising Literature

Oil Conservator.—General Electric Company, in bulletin No. 49,706, just issued, describes the construction and function of its conservator type of oil tank for power transformers.

Steel Poles.—National Tube Company, Pittsburgh, Pa., has issued "National" bulletin 14C, a forty-seven page booklet on "National" tubular steel poles, with attractive photographs of installations.

Accounting Machines.—Remington Typewriter Company, New York City, through its railroad department, has issued a booklet called "Interline Abstracting With a Daily Station and Road Balance."

Welding.—The Metal & Thermit Corporation, New York City, has just issued the third edition of Thermit Welding pamphlet No. 17 on mill and foundry repairs, fourth edition of Thermit Carbon-Free Metals and Alloys pamphlet No. 20, new and revised Thermit Rail-Welding pamphlet No. 39 and a small Thermit Railroad Instruction book No. 41.

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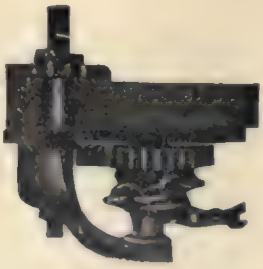

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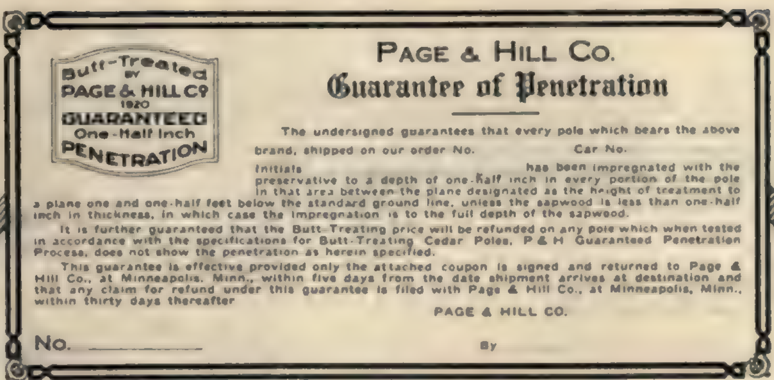

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Third—*Transportation.* He looks for these facts in the newspapers, in his own business paper, and in specialized business papers.

Fourth—*Conditions of His Own Market.* These conditions he judges from his own salesmen's reports, from the business papers.

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From six to eight pages of the fields of engineering and industry covered by the eleven McGraw-Hill publications are devoted each week to these basic facts.

Special editors and a special department in the Company called the Business News Department, organized with a far-flung chain of correspondence, provide verified news. The men in this work are in intimate personal contact with the sources of information. The Engineering and Mining Journal reports, for example, are quoted as a basis for making contracts for all metals and minerals. The Engineering News-Record's Construction News is a basis for contracts running into millions of dollars each week.

This vital contact of the business press with the industries they serve is the special reason why business men now are reading the future by studying the business papers.

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Coal Age
American Machinist
Electrical World
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Journal of Electricity
Electric Railway Journal
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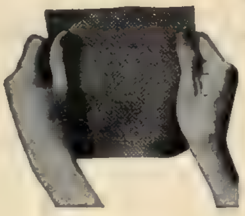
SURPACO

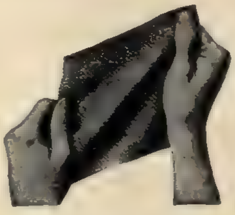
Canvas Roof Paint
Top Coat for OLD and NEW Roofs

This Is the Stiffest Test for Any Canvas Preserver—TRY IT!



After preparing the canvas as directed below, hold it this way when beginning the test. Note how completely the surface is protected — yet the canvas is springy and totally free from stiffness.

Watch the paint on the fibres as you bend and twist the canvas. Absolutely no cracking or peeling! When you release the canvas, see how the fibres snap back to their original position.



Take an 8-inch square of new canvas and paint it with SURPACO Canvas Preserver — give it a free, heavy coat so that every fibre will be thoroughly saturated.

After the Preserver dries, cover with two coats of SURPACO Canvas Roof Paint, allowing sufficient time for thorough drying between coats. Take particular care, though, not to apply too much paint in these second and third coats — the idea is to work the paint thoroughly into the fibre and rub it out with the brush as thin as possible over the surface. This keeps the canvas pliable and elastic.

Now for the test. When the paint has dried thoroughly, grasp the canvas firmly at the sides with both hands (see illustration above). Then STRETCH IT, TWIST IT, BEND IT, JERK IT in any way you wish. See how the fibres always spring back to their first position. Note the pliability of the entire piece of canvas, how it stands up under distortion and strain and always comes back to its original shape. Note that the paint surface is always unbroken.

* * *

After you have made this test yourself you will know why SURPACO Canvas Preserver and Roof Paint actually preserve the fibre without stiffening the canvas; why they so successfully withstand the constant twisting, heavy vibration and exposure to which every car roof is subjected.

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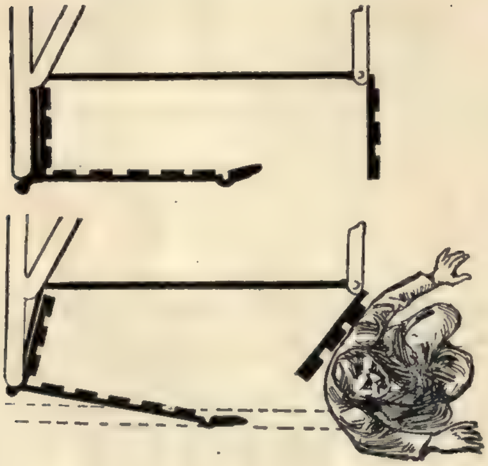

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The more use of brakes, the more wear on brake rigging—

The more wear on brake rigging, the more need for

BOYERIZED
Brake Pins and Bushings

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(Patent pending)

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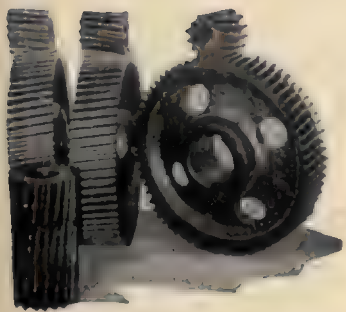

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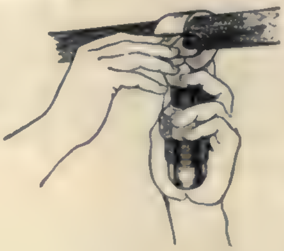

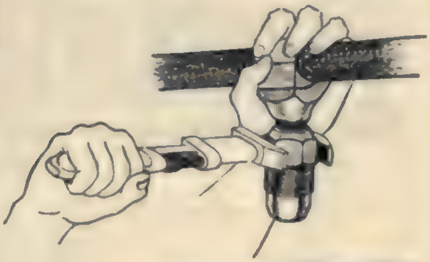

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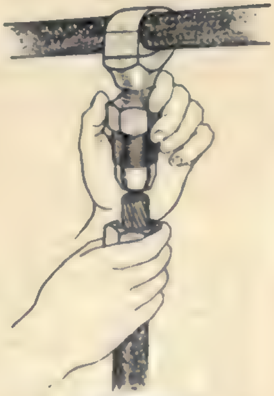

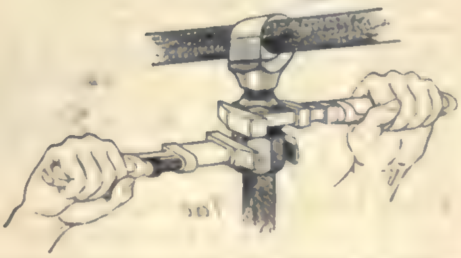

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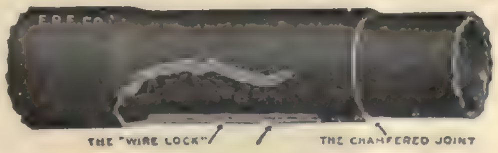

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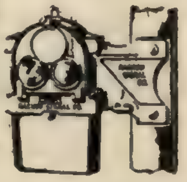

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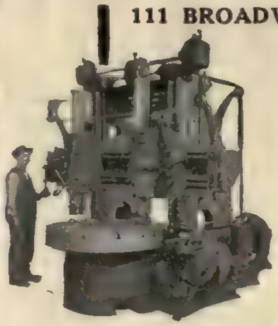

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CARBON—GRAPHITE—METAL BRUSHES

For Car and Power House Units

MEXICAN GRAPHITE CURVE GREASE
For Gears of Electric Cars
MEXICAN GRAPHITE JOURNAL AND GEAR GREASE
MEXICAN GRAPHITED WOOD GREASE

Literature and detailed information sent upon request

The United States Graphite Co.
SAGINAW, MICH., U. S. A.

Branch Offices:
New York, Chicago, Philadelphia, St. Louis, Pittsburgh, Denver, San Francisco

Largest Miners of Graphite on This Continent

CONDENSERS, SPRAY NOZZLES, VALVES, OIL BURNING EQUIPMENT, FEED WATER HEATERS, INJECTORS, Distillers, Oil Coolers, Chemical Equipment

Schutte & Koerting 1155 Thompson Street
Philadelphia, Pa.

DREW MOTORMEN'S SAFETY MIRRORS

Eliminate Accidents

Send for catalogue No. 18

DREW ELECTRIC & MFG. CO.
Collamer Ave. and Nickel Plate Railroad. Cleveland, O.

ELECTRICAL CONDUITS AND FITTINGS

WRITE FOR BULLETINS

National Metal Molding Co.
PITTSBURGH, PA.

Big Results from Little Ads

The advertisements in the Searchlight Section are constantly bringing together those who buy, sell, rent or exchange.

They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have.

The cost is a trifle, the results considerable. 0059

Get Your Wants into the Searchlight

INTERNATIONAL FARE REGISTER

Type R-10
Single Register

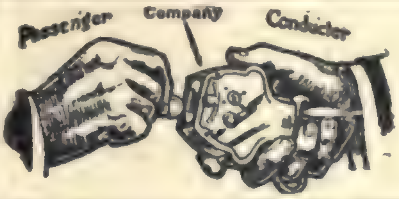
International Fare Registers. Single registers, round and square; double registers, duplex counters, car fittings, foot-operating devices for single and double registers. Exclusive selling agents for Heeren enamel cap and coat badges.

The International Register Co.
15 South Throop Street, Chicago

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD

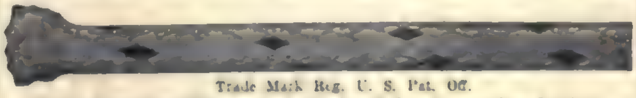
THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.



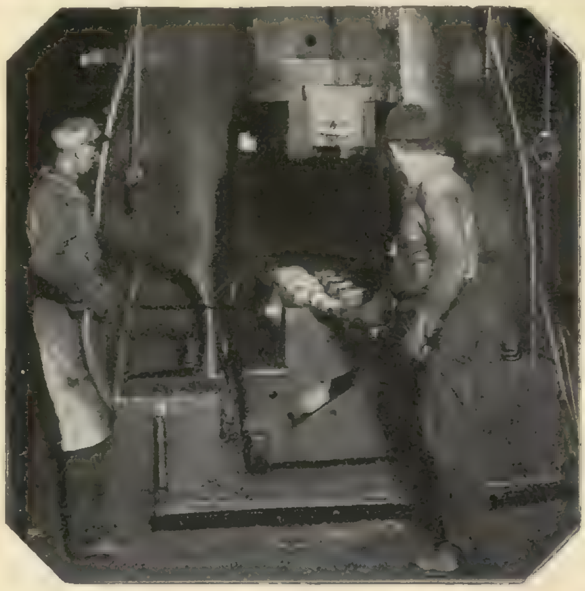
Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.



When It Comes to Drop-Forgings Come to

J. H. Williams & Co.

"The Drop-Forging People"

BROOKLYN 143 Richards St.
BUFFALO 143 Vulcan St.
CHICAGO 1143 W. 120th St.

Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

CONSOLIDATED CAR HEATING CO.
ALBANY, NEW YORK, CHICAGO

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost

The Cooper Heater Company
Carlisle, Pa.

BAKELITE-DILECTO

The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods. The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate.

The Continental Fibre Co., Newark, Delaware
Branch Offices:
CHICAGO, 332 S. Michigan Ave. NEW YORK, 233 Broadway
Pittsburgh Office, 301 Fifth Ave. San Francisco Office, 525 Market St.
Los Angeles Office, 411 S. Main St.
Canadian Office, 1710 Royal Bank Bldg.,
Cor. King and Yonge Sts.
Toronto, Ont.,

Use them in your terminals—
PEREY TURNSTILES
or PASSIMETERS

Faster than the ticket seller

Perey Manufacturing Co., Inc.
30 Church Street, New York City

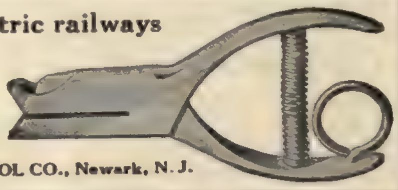
WE CAN CUT YOUR COST OF HEATING CURRENT

Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York



75% of the electric railways use

B-V Punches

Send for Catalog.
BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

162 RAILROADS
USE DIXIE CUP
Penny Vending Machines
To Solve their Drinking Cup Problems
in Cars and Stations
INDIVIDUAL DRINKING CUP COMPANY, INC.
HUGH MOORE, President
Original Makers of the Paper Cup — 220-230 W. 19th Street New York

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.
Second and Diamond Sts., Philadelphia

SPECIFY

THE TERRY TURBINE

For Driving Your Auxiliaries

TERRY STEAM TURBINE CO.
Hartford, Conn

BUCKEYE JACKS

high-grade R. R. Track and Car Jacks.

The Buckeye Jack Mfg. Co.
Alliance, Ohio

"UNION" FUSES

"Union" Renewable Fuses will save four-fifths of your fuse maintenance cost. Guaranteed to give satisfaction. Money back if they fail. Booklet on request.

CHICAGO FUSE MFG. CO.
Chicago New York

ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

ADVERTISING RATES

POSITIONS VACANT—Business Opportunities and other undisplayed ads, 8 cents a word, minimum $2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:

1 to 3 in., $4.50 an in.	15 to 29 in., $3.90 an in.
4 to 7 in., $4.30 an in.	30 to 49 in., $3.80 an in.
8 to 14 in., $4.10 an in.	50 to 99 in., $3.70 an in.

POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

ASSISTANT master mechanic, experienced, progressive and energetic on a road operating about 1,000 cars in a large city in the East; good opportunity; communications treated confidentially. P-794, Elec. Ry. Journal.

AUDITOR wanted for street railway in Eastern city; highest personal references required. Give full particulars when replying. P-792, Elec. Ry. Journal.

BOOKKEEPER wanted for street railway office in eastern city, being thoroughly familiar with I. C. C. and Public Utility N. J. classifications. Permanent position with chance of advancement. Give reference, experience and salary expected in first letter. P-807, Elec. Ry. Journal.

FIRST-CLASS barn foreman wanted for division barn on large city and suburban road. One who can use lathe and understands care and maintenance of equipment. Give experience, reference and salary expected in first lteer. P-804, Elec. Ry. Journal.

GENERAL shop foreman wanted by city and interurban eastern road. Third rail and overhead operation. State age, experience and salary expected. P-810, Elec. Ry. Journal.

MASTER mechanic wanted for Middle West on a division operating 40 interurbans on 600-1,200 volts. P-787, Elec. Railway Journal, Leader-News Bldg., Chicago.

ECTION foreman wanted for interurban and city street railway work, double track line operating out of Chicago. Give full particulars when replying. P-809, Elec. Ry. Journal, Old Colony Bldg., Chicago.

IMETABLE maker and depot clerk wanted for street railway in Eastern city. Must first qualify as competent motorman under peculiar local conditions. Give full particulars when replying. P-793, Elec. Ry. Journal.

POSITIONS WANTED

APPRAISAL and valuation engineer desires correspondence with officers or general managers who anticipate having a valuation made of their property. I am now finishing a valuation of an electric street railway for "Service at Cost" plan for operation. PW-797, Elec. Ry. Journal.

AUDITOR and accountant, high-class, desires change by first of year; 25 years' experience in steam and electric railroad, gas, electric and steam accounting. Capable of handling accounts of large corporation or company; familiar with interstate and state commissions accounting; salary $7,200. PW-788, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

CONSTRUCTION superintendent high-tension lines; catenary or cross-country interurban trolley construction experience; can apply machinery and give low cost; age 48. PW-813, Elec Ry. Journal, Real Estate Trust Bldg., Philadelphia.

DETECTIVE—man, age 32, formerly having charge of police and fire departments with a large railway company, desires a position at same with any corporation that needs a good man. Address, P. O. Box 464, Wilmington, Delaware.

ELECTRICAL engineer; two years' test experience with large electrical manufacturer; two years' design of d.c. railway motors; age, 29, not married. Position wanted with electric railway operating on high voltage d.c., or with steam railroad contemplating electrification; minimum salary to start $3,000; available after 30 days' notice to present employer. PW-799, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

ELECTRICAL engineer, 15 years' experience in electric railway and power fields which has included design, construction, operation, valuation and sales work, open for new engagement. PW-808, Elec. Ry. Journal, Old Colony Bldg., Chicago.

POSITIONS WANTED

MANAGER—Position as manager desired. Experience with large properties. Broad education; good address; capable of dealing with public and public officials, and handling laboring men. Good organizer. PW-764, Elec. Ry. Journal, Rialto Bldg., San Francisco.

MASTER mechanic now employed desires to make change; 17 years experience in all departments and types of control. Successful in handling labor. A1 references furnished. PW-795 Elec. Railway Journal, Real Estate Trust Bldg., Phila.

MASTER mechanic desires to locate with medium size road; 17 years' experience on all G. E. and W. H. motors and control. Give full particulars in first letter. PW-800, Elec. Ry. Journal.

STATION-MASTER, single; now employed, desires change. 14 years' railway experience, capable of supervising car house. First class knowledge of time tables, assigning of trainmen, auditors reports, claims in various forms. Best of references; will travel anywhere. PW-806, Elec. Ry. Journal.

SUPERINTENDENT of transportation desires a change; age 41, clean, capable, progressive; capable of organizing and supervising details of any city property; 18 years' experience dealing with public and labor in successful manner; will consider any good city or suburban property that requires extra effort. Best of references as to character and ability. Address, giving details, PW-812, Elec. Ry. Journal, Old Colony Bldg., Chicago.

WORKING barn foreman, single truck road preferred. Can do any kind of wiring, controller, repairs and wind armatures; 12 years' experience, both single and double truck. PW-798, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

FOR SALE

Patents

Electric locomotive patents 897,312 gearless locomotive and 1,116,855 electically heated boiler must be sold quickly. FS-811, Elec. Ry. Journal.

COMPLETE POWER PLANT

FOR SALE

1—500 h.p. Westinghouse Compound Engine, Direct Connected to 550 volt Generator.

2—200 h.p. Harrisburg Engines, Belt Connected to Westinghouse Generators.

1—B & W Boiler, 2 Keeler Boilers, Water Heaters, Pumps, Piping, Switchboards and etc.

All in first class operating condition. Immediate delivery. Make us an offer.

The Lewistown & Reedsville Electric Railway Co., Lewistown, Pa.

WANTED

We are desirous of purchasing two second-hand double truck

Trailer Cars

closed, with low center entrance.

W802—Electric Railway Journal
935 Real Estate Trust Bldg., Phila., Pa.

Machinery in Stock for
Immediate Shipment

ROTARY CONVERTERS

1—300 kw., Westg., 3-phase, 60-cycle, 370-v., A.C., 575-v., D.C., 600 r.p.m.
2—200 kw., G.E., 3-phase, 25-cycle, 85-v., A.C., 125-v., D.C., 8 pole, 375 r.p.m.

FREQUENCY CHANGER SETS

1—600 kva., Allis-Chalmers Frequency Changer Set, 300 r.p.m., 3-phase, 60-cycle, 2300-v. one end, 3-phase, 6600-v., 25-cycle on other end.
1—400 kw., G. E., 3-phase, 25-cycle, 6000-v. one side—2400-v., 2-phase, 60-cycle other side—375 r.p.m.

ARCHER & BALDWIN, INC.
114-118 Liberty Street, New York City
Telephone 4337-4338 Rector

—a manufacturer
in Newark, N. J.
—saved $200
buying from an Indiana dealer in
—second-hand machinery
through his advertising in the
—searchlight section

It pays
to read the Searchlight.
It pays
to advertise in the Searchlight.

0058

5—Rotaries—300 K.W.

600 volt. D.C., 25 cy. A.C. Trans. 15,000 volt with SWBD—1600 ea. 500 & 1000 kw. 60 cy. Rot. & MG. sets. $1650.00 per Station.

BARGAINS
Send for our used mach. list.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

New—Used—Rebuilt

MACHINERY AND SUPPLIES
for construction and industrial work.

READING ENGINEERING CO., INC.
154 Nassau St., New York

NEW MOTORS
FOR SALE

24—New (never used) G. E., No. 203-P, 50 hp. motors, immediate shipment.

Extra armatures and repair parts for all types of railway motors.

Transit Equipment Company
501 Fifth Avenue, New York

BARGAINS!

Garton Daniels 350-750 V. Lightning Arresters.
No. 9 Hemingray Pony Glass Insulators.
Bronze Trolley Frogs.
Flexible Pole Brackets.
Westinghouse Type A Lightning Arrester.
Watt Hour Meters.
110 V., D. C. Bonding Car.
And many other items.

ZELNICKER IN ST. LOUIS

There are many other bargains in our Bulletin No. 285. Send for a copy.

FOR SALE

16 West. 56 Motors. 4 K-14 Controllers. 4 National type BB-4 Air Brake Equipments complete. 15 Double Truck Cars, 40-ft. long, mounted on Brill Trucks equipped with 4 GE-67 Motors, 2 K-6 Controllers, Air Brakes, etc., complete.

Electric Equipment Co.
Commonwealth Building, Philadelphia, Pa.

MAC GOVERN & COMPANY INCORPORATED POWER MACHINERY

114 Liberty Street, New York, N. Y.

25 CYCLE SUB-STATION
COMPLETE

1—300 kw. Westinghouse Rotary Converter, 3 phase, 25 cycle, 625 volts D.C., 500 r.p.m.

3—150 kw. Single Phase Transformers, 6600 volts primary, 390 volts secondary.

Switchboard Panel complete with all necessary instruments.

The above outfit is offered as a unit for a quick sale.

Branch Offices:
Pittsburgh, Pa.........498 Union Arcade Bldg.
Seattle, Wash...............L. C. Smith Bldg.
Montreal, Que............285 Beaver Hall Hill

WESTINGHOUSE RAILWAY
68 and 68C MOTORS
Sacrifice Prices
WESTINGHOUSE
GRID RESISTANCE
RAILWAY BONDS
10-IN. AND 13-IN.
Suitable for overhead operation.
IMMEDIATE DELIVERY

H. E. SALZBERG CO., INC.
30 Church St., New York City

Immediate Shipment
GIRDER RAIL

300 tons 7 in. girder rail, located Amityville, New York, also 1000 tons 70 lb. rail, 2000 tons 90 lb. rail. Write or wire for prices quoted.

M. K. FRANK, Pittsburgh, Pa.

"Searchlight"
is
Quick Action
Advertising

0233

NEW
REBUILT **ELECTRIC MOTORS** REWINDING
REPAIRING

NEW A.C. MOTORS ¼ to 15H.P.—LARGE STOCK USED MOTORS
EXCELLANT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.
EST. 1895 4732-4-6 ST. CLAIR AVE., CLEVELAND, O. *INC. 19*

Get your Wants into the Searchlight

NEW
80 lb. RAIL & ACCESSORIES

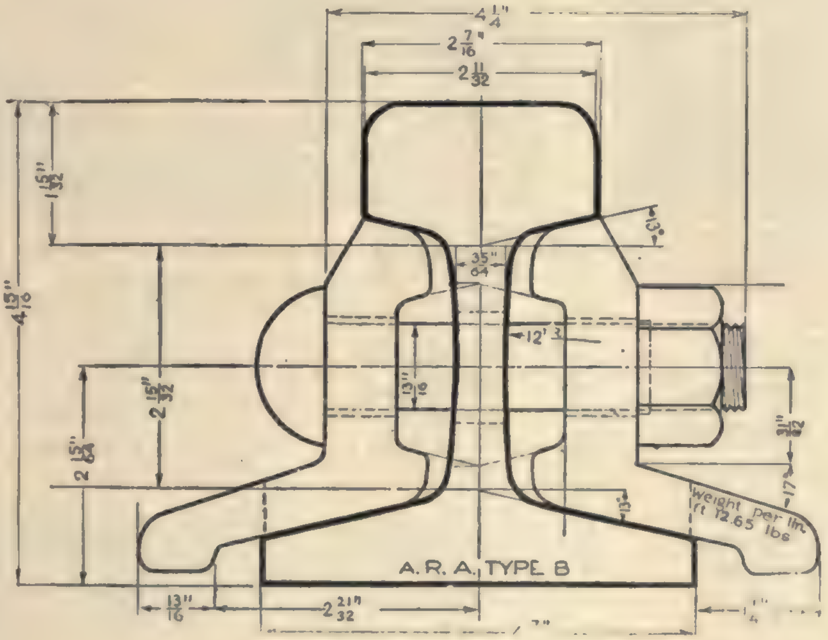
ANGLE BARS, SPIKES, BOLTS AND NUTS COMPLETE

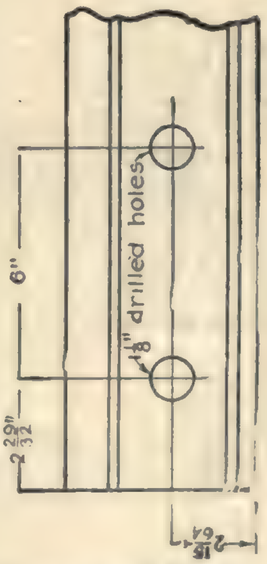
For Sale

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, N. J.





Note actual dimensions of rail stated hereon.

HYMAN-MICHAELS COMPANY

NEW AND RELAYING RAILS

Peoples Gas Building, Chicago, Ill.

New York Office
1324-1326 Woolworth Building

Pittsburgh Office
1312 First National Bank Building

We buy electric and steam railways that are to be dismantled

St. Louis Office
2115 Railway Exchange Building

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Acetylene Service and Apparatus
Oxweld Acetylene Co.

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Ammeters
Weston Electrical Instrument Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Cambria Steel Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Oxweld Acetylene Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes, Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Ackley Brake & Supply Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

Bridges and Buildings
American Bridge Co.

Brooms, Track, Steel or Rattan
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Bunkers, Coal
American Bridge Co.

Bushings
National Metal Molding Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables (See Wires and Cables)

Carbon Brushes (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Ackley Brake & Supply Corp.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car (See Headlining)

Change Carriers
Galef, J. L.

Circuit Breakers
Automatic Reclosing Circuit Breaker Co.
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Condensors, Papers
Irvington Varnish & Insulator Co.

Conduit Fittings
Chicago Fuse Mfg. Co.

Conduits, Interior
National Metal Molding Co.

Connectors, Solderless
Frankel Connector Co.
Westinghouse Elec. & Mfg Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
Portable Machinery Co.

Conveyors, Coal and Ash
Green Eng. Co.
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

Conveying and Hoisting Machinery
Allis-Chalmers Mfg. Co.
American Bridge Co.
Columbia M. W. & M. I. Co.
Portable Machinery Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co.
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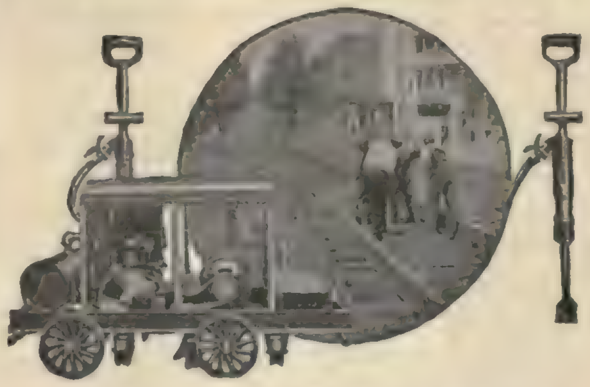

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Power Specialty Co.

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Ramapo Iron Works

Switches, Track (See Track Special Work)

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Milwaukee Tank Works

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Dayton Mechanical Tie Co.

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International Steel Tie Co.

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Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
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Trolley Wheel Bushings
Flood City Mfg. Co.

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Flood City Mfg. Co.

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Roebling's Sons Co., John A.

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American Steel Foundries
Bemis Car Truck Co.
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McGuire-Cummings Mfg. Co
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Allis-Chalmers Mfg. Co.
General Electric Co.
Terry Steam Turbine Co.
Westinghouse Elec. & Mfg. Co.

Turbines, Water
Allis-Chalmers Mfg. Co.

Turnstiles
Perey Mfg. Co., Inc.

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Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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cars and station steps.
Universal Safety Tread Company
40 Court St., Boston, Mass.

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And the Oxweld flame is responsible for the smooth edge of the fragile glass lighting globe!

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There are Oxweld Service Engineers in more than fifty centrally located cities — why not make use of their co-operation in solving your production problems?

Write, wire or telephone to the nearest of the addresses below for immediate attention.

OXWELD ACETYLENE COMPANY

NEWARK, N. J. CHICAGO SAN FRANCISCO

World's Largest Maker of Equipment for Oxwelding and Cutting Metals

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Trolley Wheels and Harps that rank as Aristocrats

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The Place For Birney Safety Cars

1. **On Heavily Traveled Lines in all-day service and supplemented during peak periods with large-capacity, front-entrance, center-exit cars.**
2. **On Lightly Traveled Lines where an improved service with short headways will stimulate car riding.**
3. **On Suburban Lines under a shorter headway schedule than maintained by other types of cars.**
4. **On Minimum Service Lines where the franchise demands some service.**

2—On Lightly Traveled Lines

On Short Headway Schedule

Birney Safety Cars are economically operated and, consequently, it is possible to place more cars in service at less total operating cost. A reduced headway schedule with a car "always in sight" will attract passengers and increase revenue. Passengers who miss one car will wait for the next if they know it will arrive quickly.

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THE J. G. BRILL COMPANY
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AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
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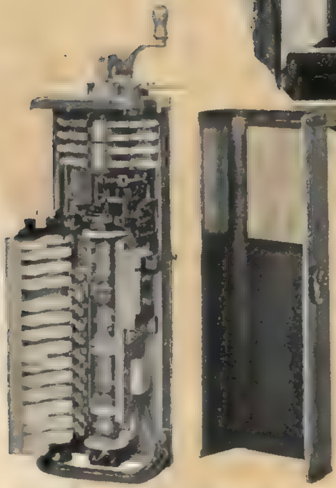

"Old Reliable" K63 Controller

Main Finger for Type K
Controllers.

Control of the Individual Car

It is a fact in the history of electric railway equipment that Controllers are not vitally different from the ones manufactured a generation ago. In those days the magnetic blowout and arc shields or barriers were first made standard.

No better testimonial to the reliability of the G-E K-Type Controller could be offered than this generation of service and experience under the widest variety of conditions.

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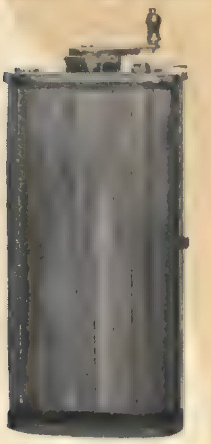

K64 Controller

Ratchet Switch as It Is Mounted in Bottom of Controller.

Line Breaker for Mounting Under Car.

General Electric Company

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Sales Offices in
all large cities

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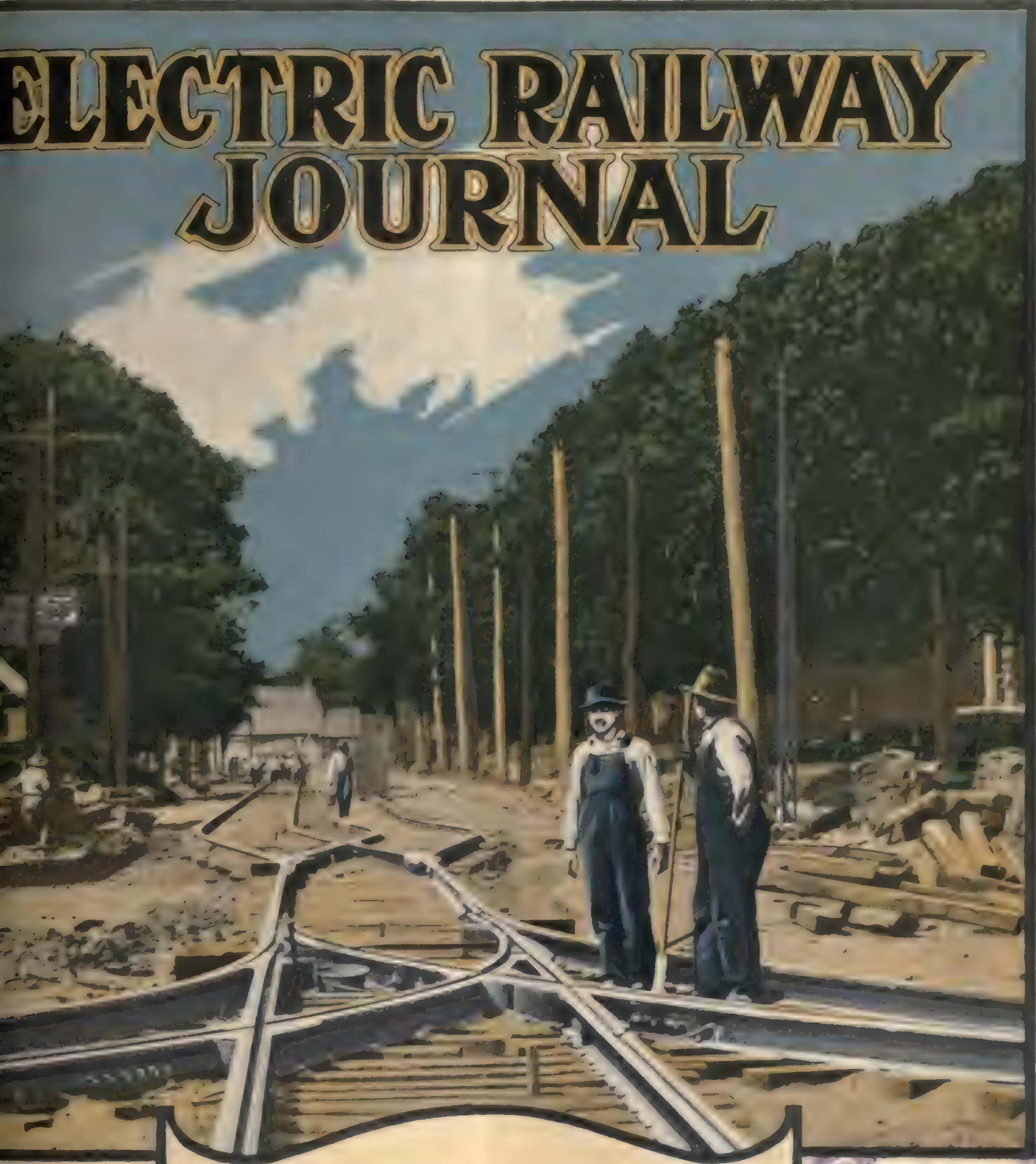
ELECTRIC RAILWAY JOURNAL



Reading Aids pave the way to Track Efficiency

Reading Reversible Rail Bender does the work of two benders of any other type.

Reading Compromise Joint—made for all sections of Girder and Tee Rails.

Reading Car Replacers will not slip. They are clamped with Reading Clamps.

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CARNEGIE LIBRARY TEXAS

Reaction

"Joe," said the Vice President, "we positively must indulge in more and better publicity in every community we serve.

"The people have changed their attitude towards us and, as a result, increased fares have been granted. Even though we are still showing a deficit, the people are entitled to some indications of better service. Let's economize here and there and spend money where the people will see it.

"We must repaint more of the cars and improve the service wherever possible, and then **let the people know about it in car advertisements or newspapers.** If we don't, a reaction of public attitude is apt to set in."

"Boss," answered Joe, "I agree with you. We ought to paint more of the cars and I'll find a way to do it. What I would like to do is to buy at least two new cars of the latest designs, with Westinghouse 514-A motors and light-weight HL control, and actually try out two car train operation for handling our rush hour crowds.

"We could get splendid publicity out of it, and at the same time satisfy ourselves as to the best type of car for our conditions and, when things settle down, we would know just what type to adopt as standard."

"Joe," replied the Vice President, "that's a splendid suggestion. Go ahead and order them."

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pennsylvania

Vol. 56, No. 25 New York, December 18, 1920 ***Pages*** **1223-1272**

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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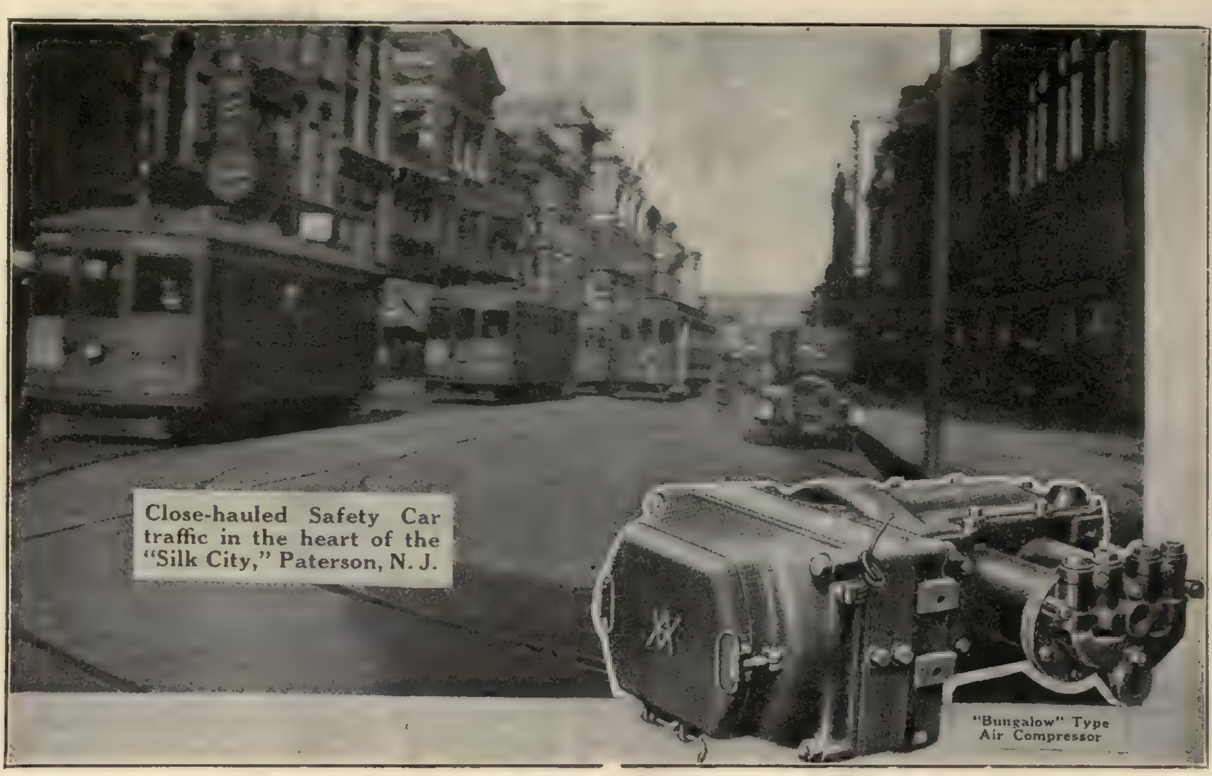


Close-hauled Safety Car traffic in the heart of the "Silk City," Paterson, N. J.

"Bungalow" Type Air Compressor

Excellent Performance Brings Its Reward

"Bungalow" Air Compressors that were selected for the entire number of 200 Safety Cars recently purchased by the Public Service Corporation of New Jersey will serve the State's largest cities, Newark, Plainfield, Paterson, Passaic, Jersey City, Hoboken, Elizabeth and New Brunswick. This is but one of many cases where excellent performance has brought its reward to the "Bungalow." All the largest orders specify "Bungalows"—Brooklyn, 200; and Eastern Massachusetts, 250.

To date 187 electric railways throughout the country have applied "Bungalows" to 3330 Safety Cars.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

TRADE MARK

New York
San Francisco

Washington

Chicago
St. Louis

Baltimore joins the growing throng. Here are two of the thirty-three safeties purchased by the United Railways & Electric Co.

SAFETY CARS HAVE PRACTICALLY ELIMINATED MAN FAILURE

Fifty-five operators were asked this leading question by the 1919 Committee on One-Man Car Operation:

"Was it (referring to accidents) due to any failure of the Safety Devices?"

And of all these only two companies had any remarks at all to make concerning accidents in which the Safety Devices Combination figured.

One reported that the operator became confused as to the proper braking position of the valve handle and the other that the trainman had been releasing his air until he had none left when he needed it. Manifestly, both accidents were *man* failures that would have occurred with any type of air-braked car.

The Genuine Safety Car has reduced man failures to the lowest possible point because

It is a Safety Car Only

when equipped with automatic, laborless apparatus, so interlocked that regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

Safety Car Devices Company
Boatmen's Bank Bldg., St. Louis
Chicago San Francisco New York Washington Pittsburgh

Phono-Electric

In Scotland's Biggest City—Glasgow

On Renfield Street, Glasgow, Scotland, a 1/4 mile section between St. Vincent and Cowcaddens, where cars are run at intervals of less than 1/2 minute—

Phono-Electric No. 00 is *making good* there—just as it is making good all through Glasgow.

Renfield Street is probably the most congested street in the city. That's why Phono-Electric is so extensively used. We suggest that *you* let it make good at the worst places first.

Bridgeport Brass Company

Bridgeport Connecticut

2192C

National Trolley Guard

A Paid up Accident Policy—with Bonuses

If National Trolley Guard just protected you from the monetary loss of grade crossing accidents it would be a good investment.

It goes further.

National Guard prevents injury and loss of life—prevents wrecked equipment—prevents undesirable accident publicity.

National Guard is a trough or open wire mesh inverted over the trolley wire. If the wheel leaves the wire, it runs on the Guard, which supplies power until the car is clear of danger.

It actually is a paid up policy. Maintenance is nil.

Made for
Double Trolley, also

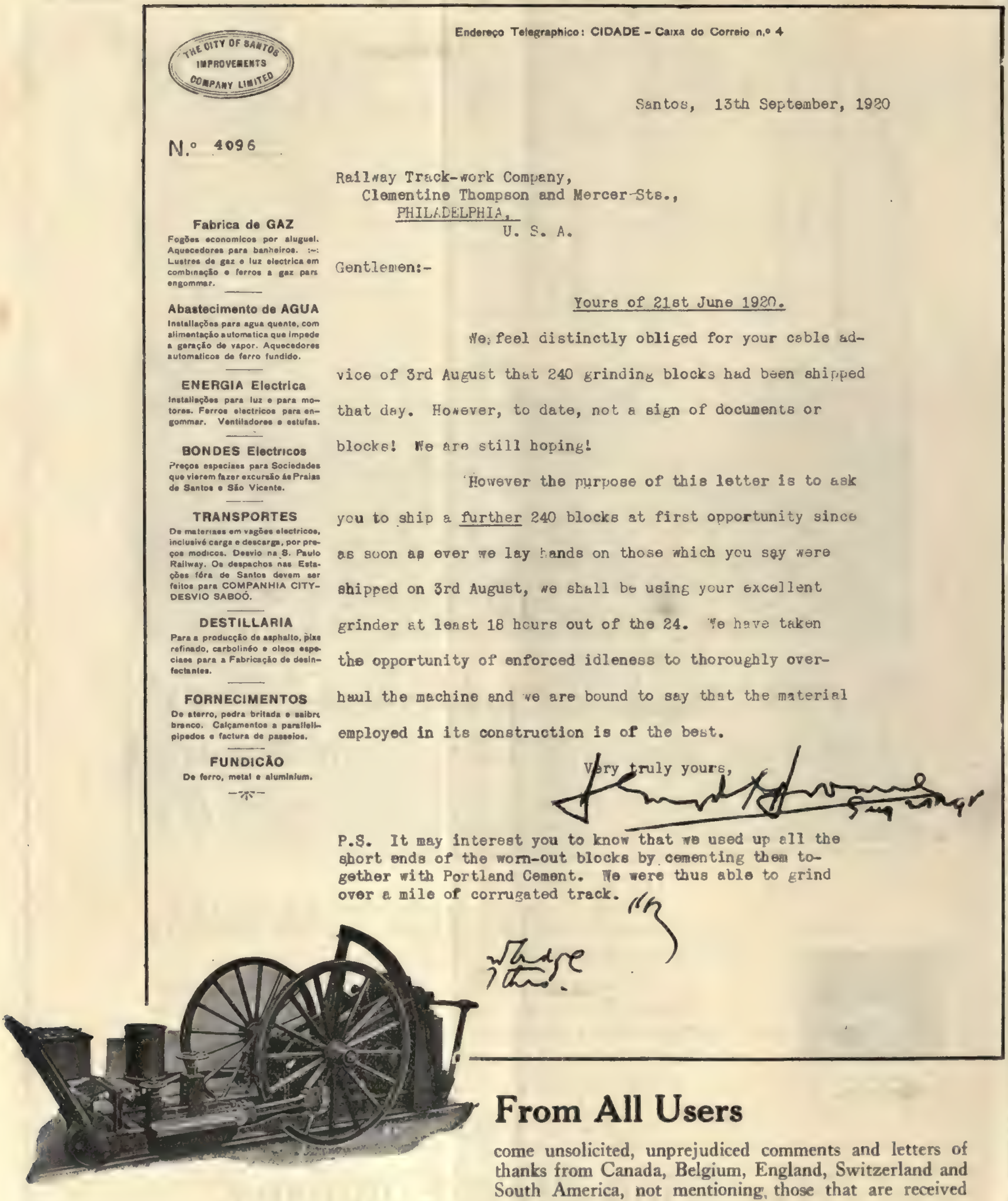
Send for "Guarding the Grade Crossing"

The Ohio Brass Company

Mansfield, Ohio

New York Philadelphia
Pittsburgh Los Angeles
Chicago San Francisco
Paris, France

Trolley Materials, Rail Bonds
Hi-Tension Porc. Insulators
Car Equipment Specialties
Third Rail Insulators



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Santos, 13th September, 1920

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Fogões economicos por aluguel. Aquecedores para banheiros. :-: Lustres de gaz e luz electrica em combinação e ferros a gaz para engommar.

Abastecimento de AGUA
Installações para agua quente, com alimentação automatica que impede a geração de vapor. Aquecedores automaticos de ferro fundido.

ENERGIA Electrica
Installações para luz e para motores. Ferros electricos para engommar. Ventiladores e estufas.

BONDES Electricos
Preços especiaes para Sociedades que vierem fazer excursão ás Praias de Santos e São Vicente.

TRANSPORTES
De materiaes em vagões electricos, inclusivé carga e descarga, por preços modicos. Desvio na S. Paulo Railway. Os despachos nas Estações fóra de Santos devem ser feitos para COMPANHIA CITY-DESVIO SABOÓ.

DESTILLARIA
Para a producção de asphalto, pixe refinado, carbolinéo e oleos especiaes para a Fabricação de desinfectantes.

FORNECIMENTOS
De aterro, pedra britada e saibro branco. Calçamentos a parallelipipedos e factura de passeios.

FUNDICÃO
De ferro, metal e aluminium.

Railway Track-work Company,
Clementine Thompson and Mercer-Sts.,
PHILADELPHIA,
U. S. A.

Gentlemen:-

Yours of 21st June 1920.

We feel distinctly obliged for your cable advice of 3rd August that 240 grinding blocks had been shipped that day. However, to date, not a sign of documents or blocks! We are still hoping!

However the purpose of this letter is to ask you to ship a further 240 blocks at first opportunity since as soon as ever we lay hands on those which you say were shipped on 3rd August, we shall be using your excellent grinder at least 18 hours out of the 24. We have taken the opportunity of enforced idleness to thoroughly overhaul the machine and we are bound to say that the material employed in its construction is of the best.

Very truly yours,

P.S. It may interest you to know that we used up all the short ends of the worn-out blocks by cementing them together with Portland Cement. We were thus able to grind over a mile of corrugated track.

From All Users

come unsolicited, unprejudiced comments and letters of thanks from Canada, Belgium, England, Switzerland and South America, not mentioning those that are received from various parts of the United States.

RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia

Exclusive Agents—West
ATLAS RAILWAY SUPPLY CO.
Chicago, Ill.

ELECTRICAL ENGINEERING & MANUFACTURING CO.
Pittsburgh, Pa.

Exclusive Agents—New England
CHAS. N. WOOD CO.
Boston, Mass.

HITCHCOCK, LLOYD & CO., Inc.
77A Queen Victoria St., E. C.
London, England.

Eight Chunky Steel Rail Clips Against Twelve Spikes

In six feet of track, the unit taken care of by one Steel Twin Tie, there are eight heavy steel rail clips compared to the twelve driven spikes with wood ties.

Thirty per cent fewer rail fastenings economize at least thirty per cent of the cost of fastening rails to ties.

Gaging is practically eliminated because the tie punching spaces the rails accurately to a shop tolerance of fifteen one-thousandths of an inch.

These savings are only minor points in Steel Twin Tie economy. Complete data, prices and track plans forwarded on request.

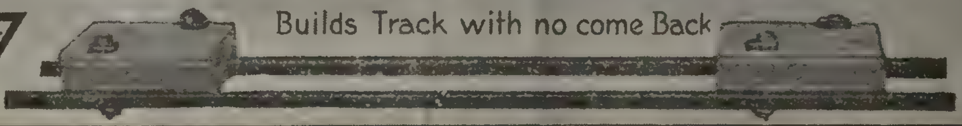
The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

The RESILIENT RAILWAY TIE

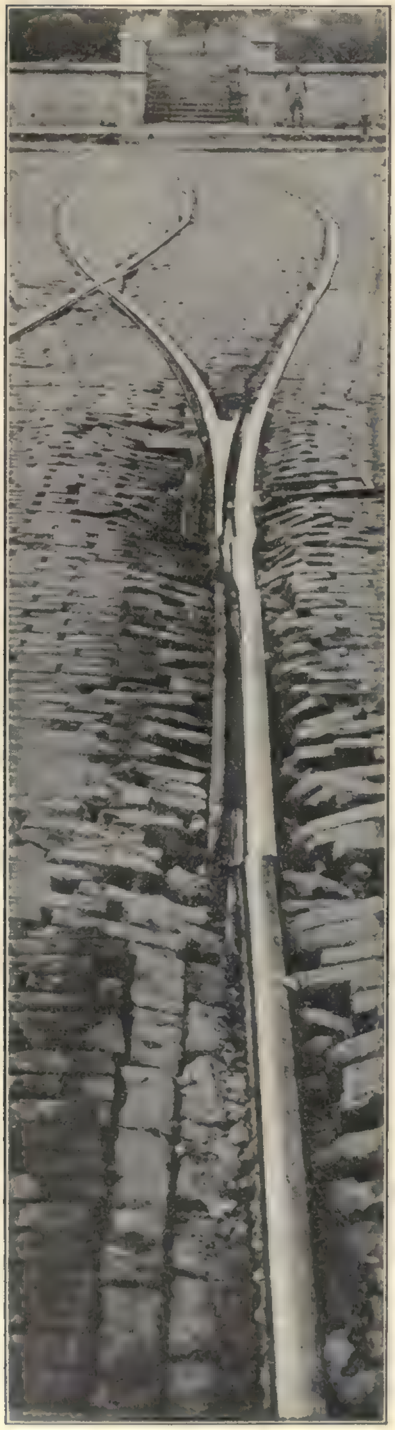
Builds Track with no come Back



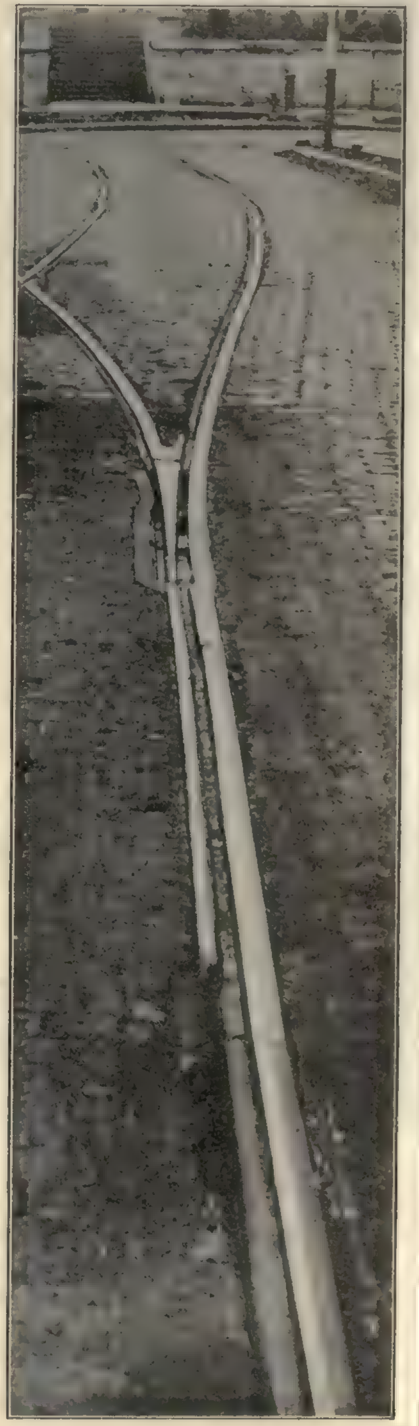
DMT Co

Resiliency applied to loose and sunken joints

Before



After



Loose and sunken joints result from poor foundations. They often necessitate the reconstruction of track, long before the portion between joints has given its maximum service.

Shimming up the joints is only an expensive temporary repair and does not remedy the real cause of the joint failure. THE DAYTON JOINT BOOSTER fastened to the base of the rail affords the means of applying a concrete foundation to the joint, which will be preserved through its

Resiliency

and make the repair permanent.

The installation is simple, inexpensive, and with no interruption to traffic.

Four dollars and fifty cents will buy this permanent cure. Order today and learn for yourself.

THE DAYTON
MECHANICAL TIE CO.
704 COMMERCIAL BUILDING
DAYTON, OHIO

SPECIFY THESE

KEYSTONE SPECIALTIES

When you buy Safety Cars

WRITE FOR BULLETIN NO. 167

Keystone Rotary Gongs

THE Birney one-man Safety Car has been called the Ford of the electric railway industry.

At any rate it is certainly the first STANDARD car of the electric railway industry.

We are proud of the fact that these Keystone Car Specialties have already gone on or been specified for practically every Birney Safety Car.

Faraday Car Signals

Keystone Air Sanders

Keystone Trolley Catchers

Illuminated Car Signs

"Golden Glow" Headlights

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church St.

CHICAGO
Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

HABIRSHAW

"Proven by the test of time"

Insulated Wire & Cable

End of Car for New York Subway Service

Car Jumper Cables

THE four car jumper cables shown in the illustration are for the following purposes (from left to right):

10 conductor cable — Train control, connecting contactors.
4 " " — Electrically controlled brakes.
1 " " — Door Signal for Motorman.
7 " " — Train line Bus.

These are all vital to the successful operation of the trains and are made with a practical realization that the demand for fast, safe and uninterrupted service is imperative.

Habirshaw wires and cables are used by the largest electric railways in the country for all parts of the system.

Habirshaw Wire Manufactured by
Habirshaw Electric Cable Co.
Incorporated
Yonkers, New York

Habirshaw Wire Distributed by
Western Electric Company
Incorporated
Offices in All Principal Cities

Paper Insulated Cable
Round Conductor Cables
Sector Cables

Varnished Cambric Insulated Cables
Armored Cables

Rubber Insulated Cables
Code (Black Core)
Intermediate (Red Core)
30% Hevea R.S.A. Standard

Capital Service to the Capitol is given
with trains that are Pneumatized

Only National Pneumatic "Rushour" Equipment Can Produce Maximum Advantages From Trailer Operation

A trailer car costs about one-quarter as much for upkeep, one-third to one-fourth as much for power and one-half as much for platform expense as a motor car of like capacity.

If the motor car's overload capacity is enough to bridge over the peak periods, the only thing you need to do to get these economies is to install equipment that will enable you to keep up the motor car schedules and assure safety.

That means the use of two or more members of the National Pneumatic "Rushour" line as already adopted on hundreds of cars in two-car and three-car surface operation and up to ten-car rapid transit operation.

Let us figure with you on the installation of National Pneumatic

Door and Step Control
Door and Step Operating Mechanisms
Motorman's Signal Lights
Safety Interlocking Door Control
Multiple Unit Door Control

if you want trailer economies without trailer drawbacks.

National Pneumatic Company, Inc.

50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

Fish Plate Welding

The Lincoln Carbon Arc Process costs less, lasts longer, has greater conductivity and makes permanent track construction.

Track Welding

Immediately after welding the joint, the RWB Dynamotor using the metallic arc builds up cupped rails, corrugated track, special work, etc.

Bonding

It takes approximately one minute to actually weld a Lincoln bond to the rail. Now figure what your bonding crew can do.

Shop Welding

Gear cases, pinions, shafts, car wheels—in fact anything weldable is done by the same versatile dynamotor.

LACKOFKNOWLEDGEHURTS

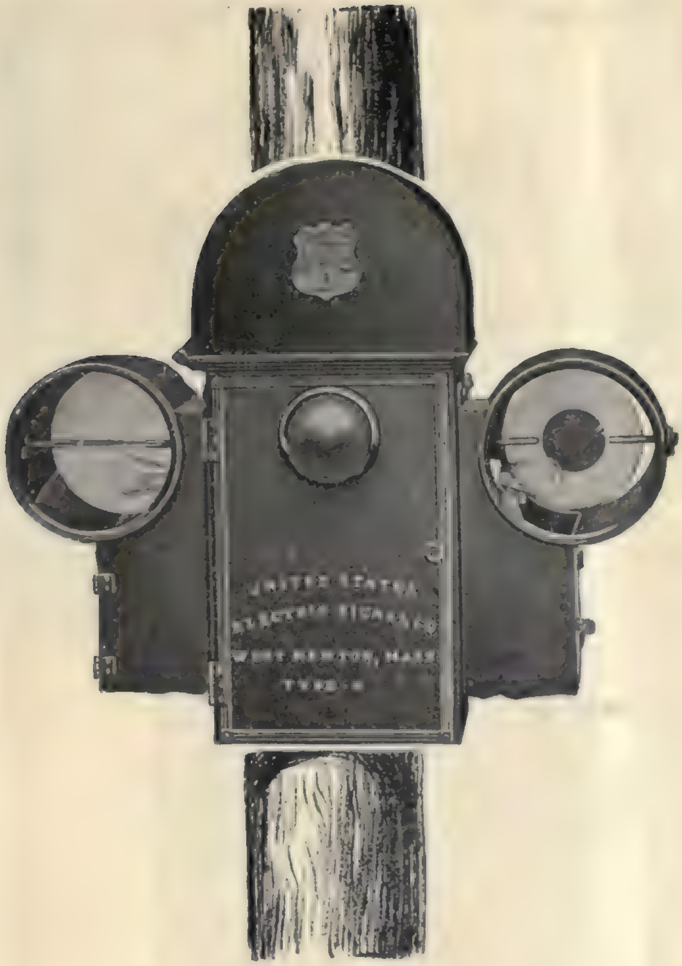
Rail Welding and Bonding Company

formerly The Lincoln Bonding Co.

RWB

Cleveland, Ohio.

London Representative: Electrical Apparatus Export Corporation, 408-9 Bank Chambers, High Holborn
New York Office: 30 Church Street
Chicago Office: 343 So. Dearborn Street



U. S. Electric Signals

For Safety

On single track lines where headway is short an adequate signal system is not only necessary—it is imperative.

U. S. Electric Signals installed on your trackage protect all traffic; they are large and cannot be misread. Fitted with both discs and lights, they can be seen at any time of the day.

U. S. Electric Signals are so installed that the first car to reach a cut-in contactor has the right of way against opposing cars—preventing side swiping accidents and providing front and rear protection as well. They provide absolute operating safety on single track lines.

Write for particulars.

United States Electric Signal Company
West Newton, Massachusetts
Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Services Supply Co., Salford, England

THERMIT

Insert Rail Weld

The only practical fully welded joint on the market. Fully as strong as the unwelded portion of the rail, both in direct tension, bending and other strains. No change in section to interrupt the wave motion and elastic curve. Its electrical conductivity is the same as the rail itself and this electrical conductivity will not depreciate with time.

METAL & THERMIT CORPORATION

General Offices, 120 Broadway, New York

Cheatham Switches

and 10.82 M.P.H. in Cleveland

The Cleveland Railway averaged in 1919 a platform expense of 11.9 cents per car mile.

It would have been a lot more if the company hadn't succeeded in getting up to the splendid schedule speed of 10.82 miles an hour (exclusive of layovers).

This top-notch schedule speed with big-cars train operation (200 passengers on 2 cars) came about in various ways—but one of the most important was automatic operation of track switches by *"Cheatham Switches."* Each stop eliminated, saves 30 seconds running time.

Faster loading and unloading was possible where motorman's attention was not required for throwing switch, manually, at stops.

We feel sure the "Cheatham Switch" can help you, too.

Cheatham Electric Switching Device Co.
4780 Louisville Ave., Louisville, Kentucky

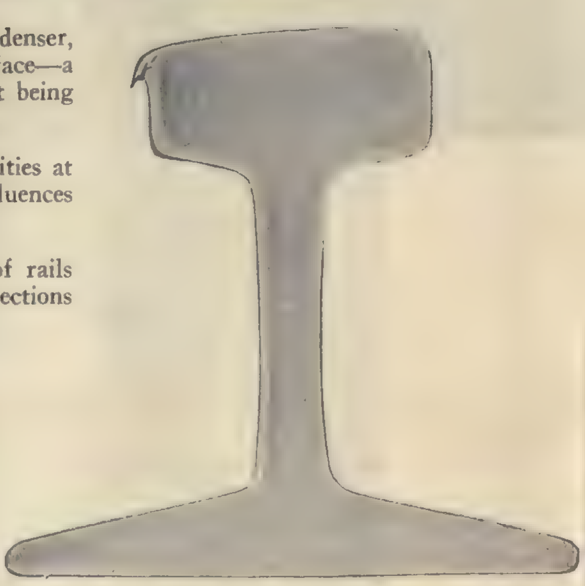
Lackawanna Deseaming Process

Reduces Wear on Rail Heads and makes Car Wheels last longer

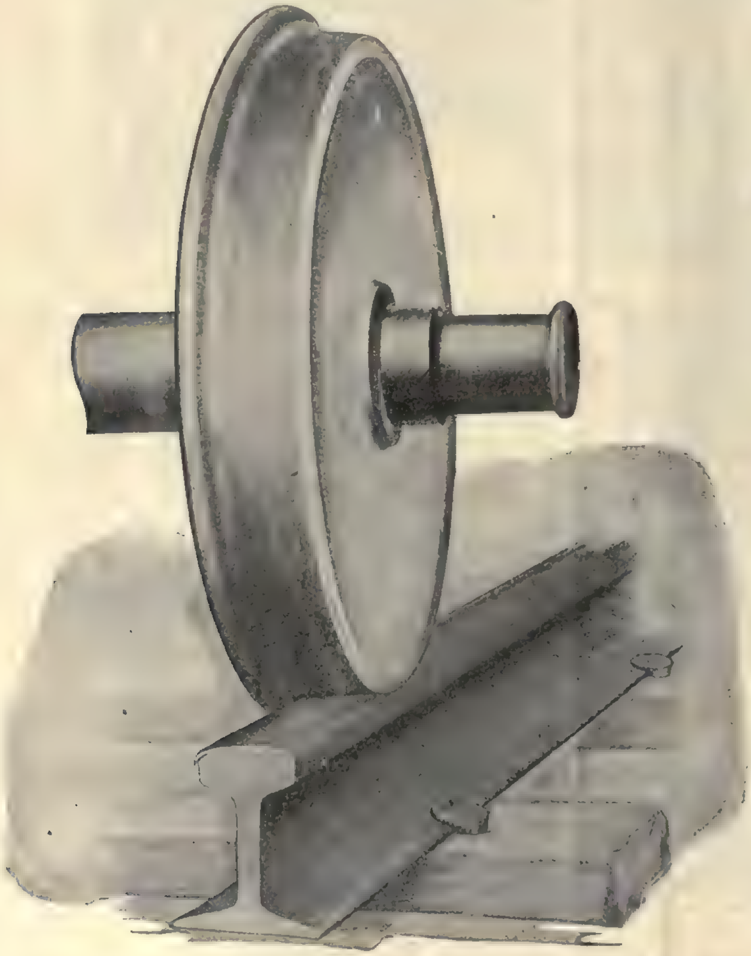
Authorities agree that in any hot-rolled shape, the interior metal is denser, more homogeneous, stronger and harder than the metal at the surface—a condition which results from the original surface metal of the ingot being rolled into the finished shape.

Metal at the ingot surface entraps air and is subjected to the impurities at the surface of the ingot mold, and later is subject to oxidizing influences in the soaking pits.

That this softer, weaker metal is actually present in the surfaces of rails made in the ordinary way is proven by examination of etched rail sections under the microscope and by faults developed in the rail in service.



Cross section of a rolled steel rail, showing the skin surface exaggerated and how the soft metal sloughs off the head under the cold rolling action of the wheels. The partly decarburized surface metal of the ingot is smoothed out and stretches in the ordinary rolling process and it still remains weak. As far as the rail head is concerned, the action of wheels in service merely continues the stretching until the distortion of the head makes the rail useless.



Every experienced railroad man has noticed how the soft metal wears off the rail head unevenly and uncertainly, leaving humps on the steel surface and slivers of soft steel sloughed off at the side of the rail head.

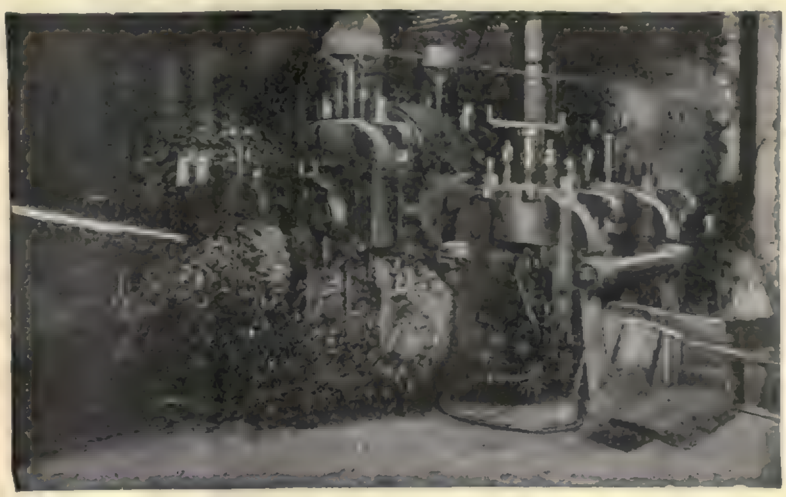
It takes quite a while for wheels to cold roll the soft decarburized surface metal off the rail head before the hard interior metal of the rail begins to offer resistance.

The wearing down of the rail head during this period and the irregular running surface finally developed impose extra duty on the car wheels. Both wheel and rail surfaces wear out sooner than they should, and this means unnecessary maintenance expense.

ALL LACKAWANNA RAILS ARE DESEAMED

Lackawanna Deseamed Rails eliminate these faults in the only logical way. They are rolled the same as ordinary rails except that after the roughing passes the weak surface metal at the location of the rail head and base is *hot-milled off* and in the final passes the rolls are applied directly to the hard interior metal at these vital points.

The milling machine for accomplishing this was designed entirely by our own engineers and under our own exclusive patents. Long experience in rail manufacture enables us to state positively that this process is a decided advance in rail making and worth much money to the rail user, yet we charge no more for Lackawanna Deseamed Rails that you would pay for others less satisfactory.



The Lackawanna Deseaming Machine at work. The milling cutters take a generous depth of metal off the top and the bottom of the rail bar on its fifth pass through the mill.

Send for our book "Lackawanna Deseaming Process"

Other Lackawanna Aids to Better Track

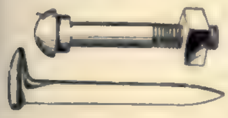
The Lackawanna Safety-Head Angle Bar

overcomes liability to wear and fracture by preventing cutting of the bar at the top from back action or upward thrust of the rail ends. This is accomplished by a slight depression in the head of the angle bar for a short space at the center where the rail ends meet.

The Lackawanna Hook-Shoulder Tie Plate

is simple, strong, durable, convenient for installation, and by holding the rail with great security prevents undue wear and destruction of material; saves repair costs and reduces maintenance labor.

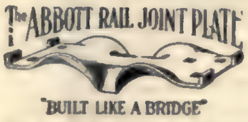
Two ribs on top form a channel in which the rail base rests. One of the ribs is plain and the other hooked to make a holder. One or two plain spikes on the plain rib complete the bond between plate and both rail flanges. The plate is fastened to the tie by independent plain or screw spikes. The rail may be removed without disturbing the plate.



Lackawanna Track Bolts & Spikes

Our track bolts and spikes, of all standard sizes for light or heavy rails, enjoy an enviable reputation for careful, accurate workmanship and finish.

The Abbott Rail-Joint Plate


The ABBOTT RAIL JOINT PLATE
"BUILT LIKE A BRIDGE"

strengthens and otherwise improves ordinary angle bar joints of standard and light tee and girder rails. Its use assures smooth running track surface without the necessity of constantly raising and tamping the joint ties, avoids annoyance and expense from worn and broken bolts and angle bars and protects the rail ends from battering and breaking down.

The hard steel and combination of reversed flanging within the plate provides for internal stresses and imposes the load on the two joint ties with about the same action as between a short deck bridge and its piers. Upturned corner lugs engaging the ends of the angle bars act as anti-creepers and as rail guards to prevent misalignment if the angle bars break or become loose.

Abbott Plates are equally applicable to and advantageous on new or relaid track and will extend the life even of old track for several years. These plates are made in types especially suitable for ordinary steam railway service, for use in paved streets, and for welding to the rail base, and may be held with either screw or ordinary spikes.

Write for our Booklet

"Improved Track Appliances"

Lackawanna Steel Company

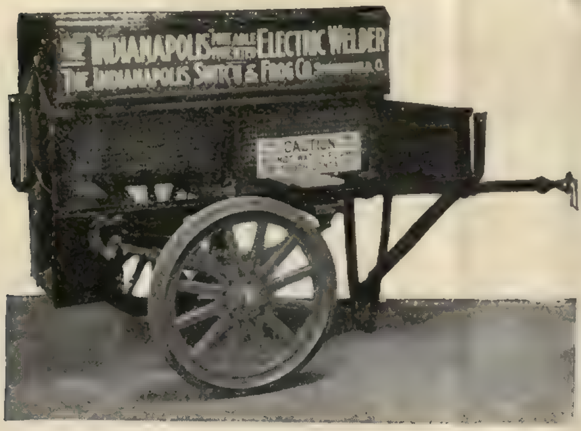
General Sales Office and Works: Lackawanna, N. Y.

Boston Buffalo Chicago Cincinnati Cleveland Detroit New York Philadelphia St. Louis San Francisco

508

SOLE EXPORTER OF OUR COMMERCIAL PRODUCTS CONSTECO CONSOLIDATED STEEL CORPORATION [illegible] BROADWAY NEW YORK, U.S.A.

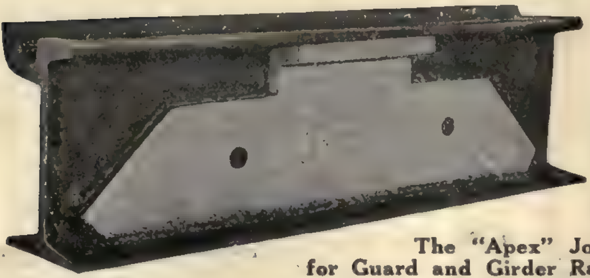
How much of your coal pile goes out at your railjoints?


THE INDIANAPOLIS ELECTRIC WELDER
THE INDIANAPOLIS SWITCH & FROG CO.
CAUTION

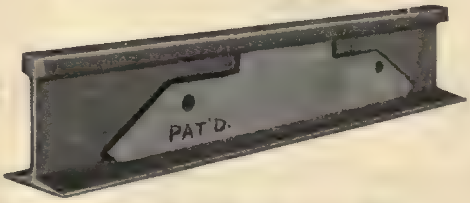
Sounds Funny!

But in power wasted, it means many tons every month at ($) per ton unless you are fortunate in having a perfect return circuit made perfect by

Indianapolis Apex Joints



The "Apex" Joint for Guard and Girder Rails



"Apex" Joint for Tee Rail

Under maximum Wheel Load a deflection of but .018 in. was proven in a test made by Robert W. Hunt & Co., of Chicago, on an Indianapolis "Apex" joint.

A test of the "Simplex" Joint by the bureau of Standards, Washington, D.C., showed the conductivity of this joint as 138 against 100 on unbroken rail.

"Indianapolis" Joints are adapted to severe, continuous service under varying conditions; they reinforce the rails at the vital spots; they are made of the strongest, toughest materials and are designed and built in accordance with highest engineering skill and accepted railroad practice. Hundreds of railway companies are using them with extremely satisfactory results.

Emergency Welding can be done quickly and economically with an Indianapolis Welder.

"The Greatest Aid of the Way Engineer."

Write for details

INDIANAPOLIS SWITCH & FROG CO.
SPRINGFIELD, OHIO

Making Railway Jobs Attractive

Sherman Service sells the man to the job, and brings him to a clear realization that it is to his own personal advantage to give a full day's work for a full day's pay.

We make the railway industry more attractive to high-class, efficient workers, thus reducing absenteeism, waste, and labor turnover; we foster harmony and morale, and obtain co-operation between men and management.

> *"The Brain Power of the Worker Is the Most Neglected Asset in Industry."*

The results which we achieve have made Sherman Service the recognized leader in the industrial field. It now requires 13 offices located in industrial centers, and an organization of more than 1,000 specialist-members to serve our clientele which comprises all basic industries, from those employing 50 workers up to 100,000 workers each or more. Electric railways are finding our service of great value.

Our nearest office will gladly send a representative who will explain what Sherman Service can do to increase your results.

Phone, wire or write. No obligation.

SHERMAN SERVICE INC.

Production Engineering Industrial Co-ordination

New York
2 Rector St.
Cleveland
Park Building

Chicago
208 So. La Salle
Detroit
73 State St.
Pittsburgh
401 Wood St.

Philadelphia
1211 Chestnut St.
New Haven
42 Church St.
Kansas City
Reliance Bldg.

Boston
10 State St.
Providence
10 Weybosset St.
Montreal
Drummond Bldg.

St. Louis
314 No. Broadway
Toronto
10 Adelaide St., East

Largest organization of its kind in the world.

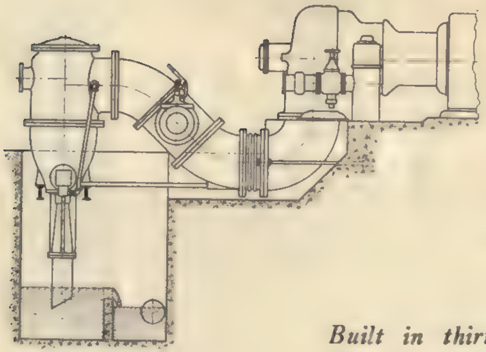
Copyright, 1920, Sherman Service, Inc.

Increase Your Dividends By Cutting Down Power Cost

Steady high vacuum economically maintained will reduce the steam consumption of your turbines and will save coal.

KOERTING Multi-Jet Condensers

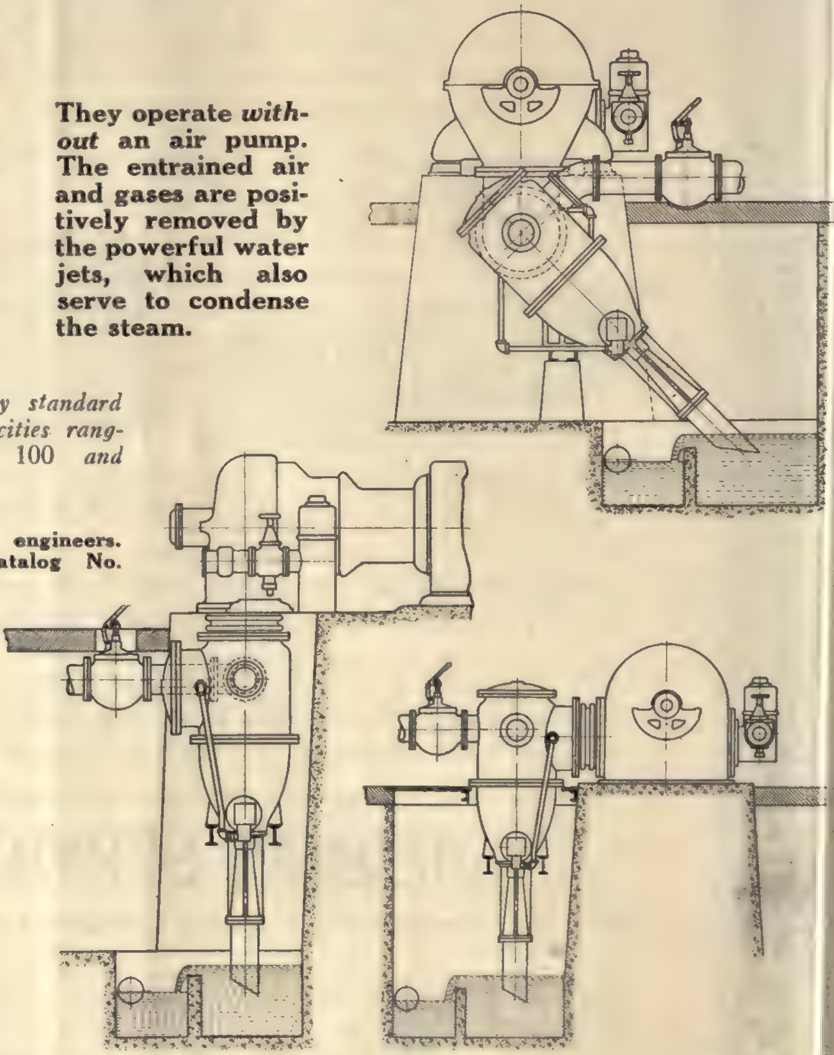
are of the low level jet type. Their efficiency over widely fluctuating loads has been proved over and over again in leading railway and other public service plants.

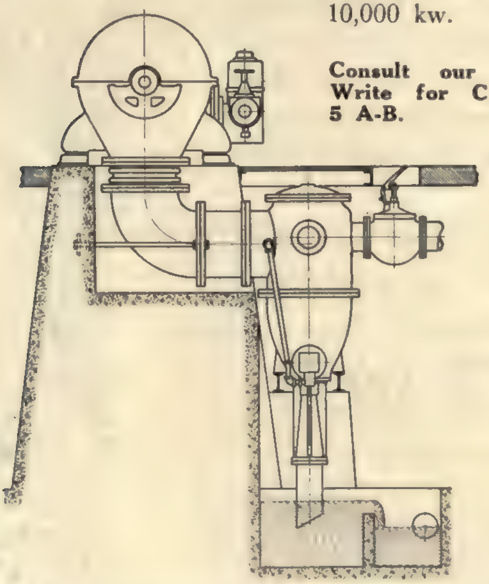


They operate *without* an air pump. The entrained air and gases are positively removed by the powerful water jets, which also serve to condense the steam.

Built in thirty standard sizes for capacities ranging between 100 *and* 10,000 kw.

Consult our engineers. Write for Catalog No. 5 A-B.





VALVES
INJECTORS
CONDENSERS
SPRAY NOZZLES
CHEMICAL EQUIPMENT

SCHUTTE & KOERTING

1155 Thompson St. Philadelphia Pa.

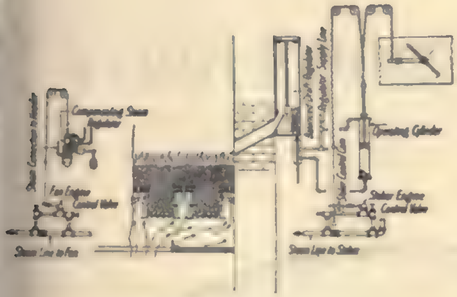
New York Boston Pittsburgh Chicago Cleveland Denver

OIL BURNING EQUIPMENT
EVAPORATORS
DISTILLERS
OIL COOLERS
FEED WATER HEATERS

Balanced Draft

Produced exclusively by The Engineer Company

A typical installation of Balanced Draft, showing every element of Combustion in perfect step through automatic control.



This diagram shows the source of control used by Balanced Draft. Plant Header Pressure controls air supply. Overgrate pressure, as determined by the rate of combustion in each boiler controls draft and fuel feed.

Why Hand-Controlled Boilers Are Passing!

A typical test which proves the case for Balanced Draft

"I RAN a test for sixty days, alternating two days with and two without Balanced Draft. I used my best men—gave them draft gages and CO_2 analyzers, and had them constantly adjust the air and the flue dampers.

"We did everything we could to beat Balanced Draft, but never got better than two or three per cent below the results secured by automatic regulation.

"If you can do no better than this with hand control under test conditions, what can you hope to do with ordinary conditions?

"You must have automatic control of your boilers. Balanced Draft will adjust for changes in the boilers that your best man can't see."

This is what a prominent New York Engineer told the management committee of a well-known public utility company several years ago.

Today Balanced Draft is saving money and fuel for plants generating several millions of horsepower. Its complete automatic regulation of combustion marks a most important forward step in the economical conversion of fuel into power, and approximates more nearly than is possible with hand control, the much sought goal of perfect combustion.

Every executive, Engineer and plant superintendent who seeks higher operating standards will find a story of intense interest in our latest book, "Modern Practice in Combustion Control." It is a treatise on Combustion in general, explaining the sure, simple working of Balanced Draft with a record of its success.

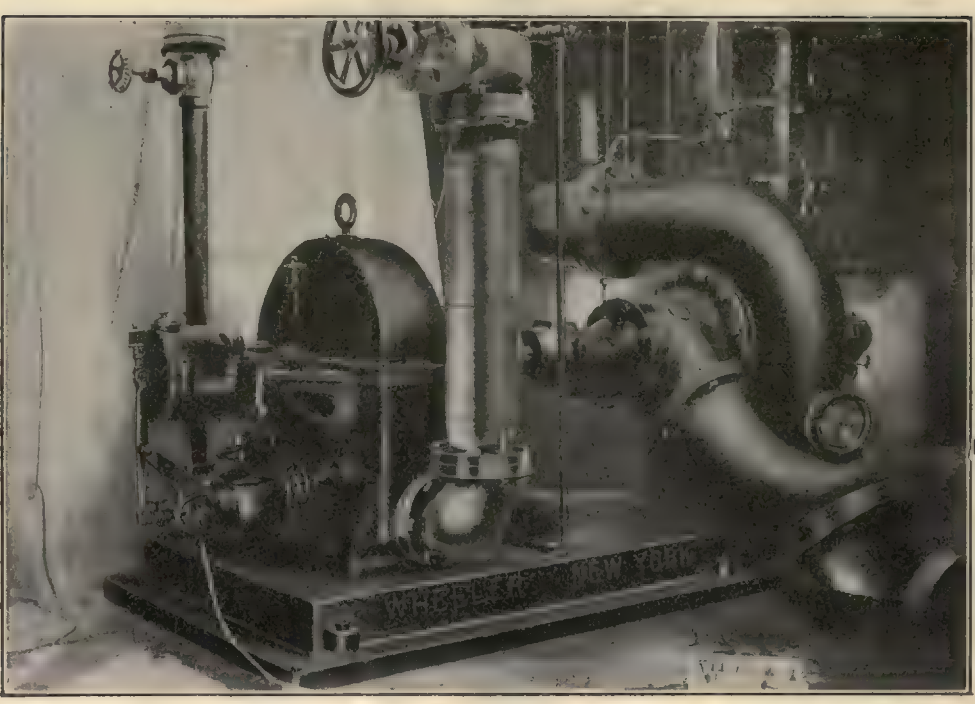
It will be sent on request. Write for it today.

Everything cannot be told in one advertisement. Send today for this booklet which gives a complete explanation.

The Engineer Co.

17 Battery Place **New York City**

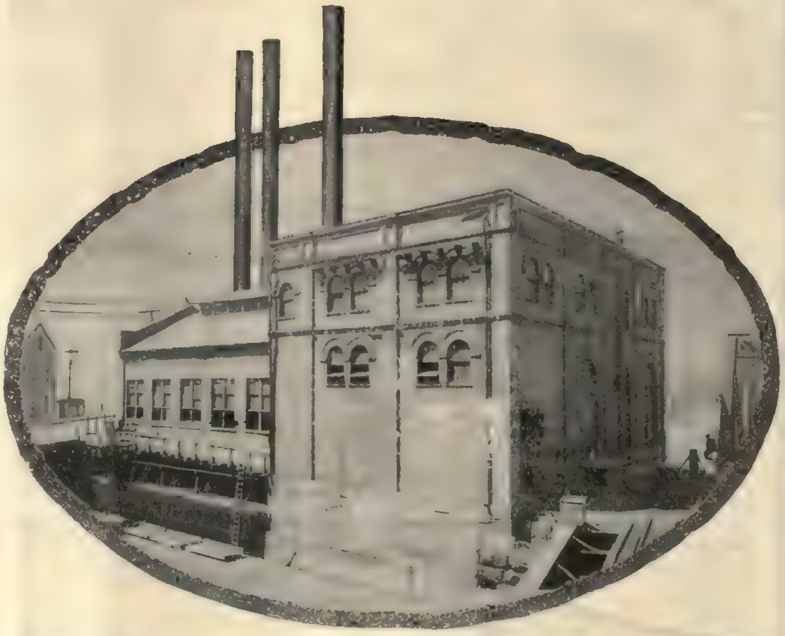
Atlanta, Trust Co. of Georgia Bldg.; **Boston**, 10 High Street, **Chicago**, 1414 S. Michigan Ave.; **Cleveland**, 515 National City Bldg., **Detroit**, 870 Woodward Ave. **Indianapolis**, 2506 N. Delaware St., **Milwaukee**, 614 Security Bldg., **Minneapolis**, Builders' Exchange Bldg., **Montreal**, Coristine Bldg., **New Orleans**, 847 Baronne Street, **Philadelphia**, 1010 Harrison Bldg. **Pittsburgh**, Jenkins Arcade Bldg.; **St. Louis**, Railway Exchange Bldg., **Wilkes-Barre**, 21 Bennett Building.



Without Repairs Ran 43,000 Hours

Sounds like perpetual motion, doesn't it? But we have it on the authority of the Ohio Electric Railway Co., of Zanesville, Ohio, that this, the performance of their Terry, although surprising, is gratifying in the extreme.

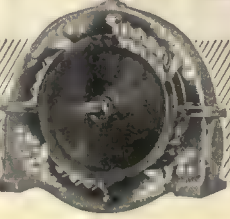
Laws are not made on the basis of exceptional cases, but as every Terry is endowed with the same qualities and as the design of each Terry is based on the same engineering principles developed in twenty years of actual experience, it is reasonable to expect that with the same care and attention you will receive even better service today if you specify—



THE TERRY TURBINE

Offices in Principal Cities
in U.S.A. also in Important
Industrial Foreign Countries

The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.



EXPORT TRADE
can help America NOW

WRITERS and speakers have repeatedly urged the great and growing need of export trade on the part of American industries.

With normal domestic consumption below our greatly expanded facilities for production, foreign trade is vital to our continued prosperity and progress. Fluctuations of demand in the home market today emphasize the special value of foreign trade as a compensating force tending to offset the disturbing influence of such fluctuations.

Foreign trade can help America NOW—and American producers and sellers can best serve the national welfare, and their own interests by equipping for successful trading in the foreign field.

SUCCESSFUL foreign trading is founded on an exact understanding of the market. In fact, this truth holds good in all trading —domestic as well as foreign. But in foreign commerce it is imperative.

It is, then, an immediate essential in the promotion of foreign trade to seek the aid of agencies through which information of dependable character, and in a form directly usable by *you* in relation to the market possibilities and conditions affecting *your* particular commodities, can be obtained.

The means of foreign sales promotion adopted should, moreover, be especially organized to present *your* special proposition in just the right way to just the right people.

INGENIERIA INTERNACIONAL provides this double service to the manufacturer and export manager seeking to market machinery and industrial equipment in Latin America and Spain.

Its *Research Department* has exact information available to *you* in regard to a great variety of general and specific products of the above mentioned character in these fields.

Fifteen thousand engineers and industrial executives look to each issue of INGENIERIA INTERNACIONAL for dependable and exact information on engineering progress and accomplishment, and for data on machinery and equipment, vouched for by publication in its advertising pages.

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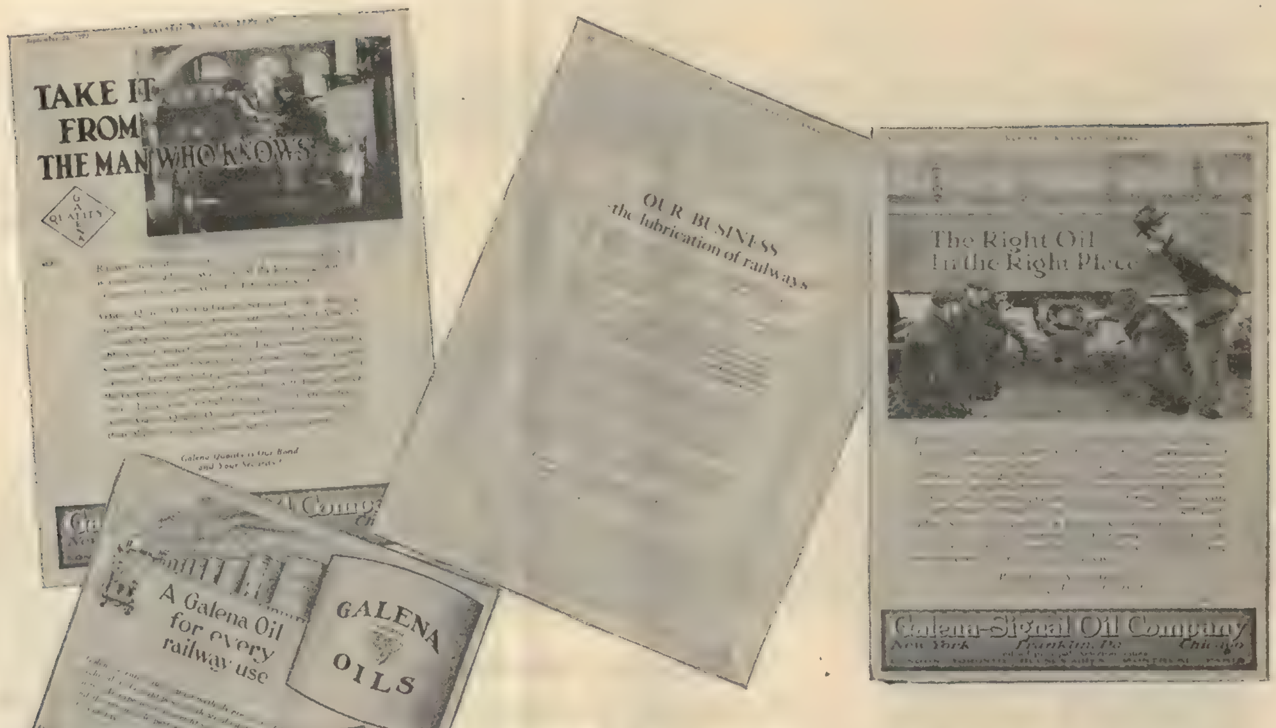

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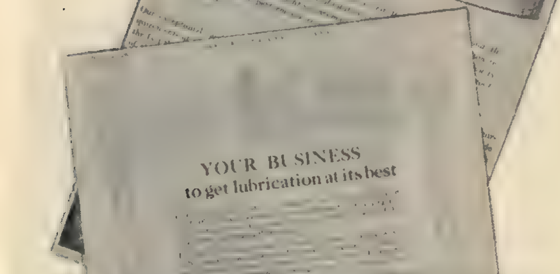

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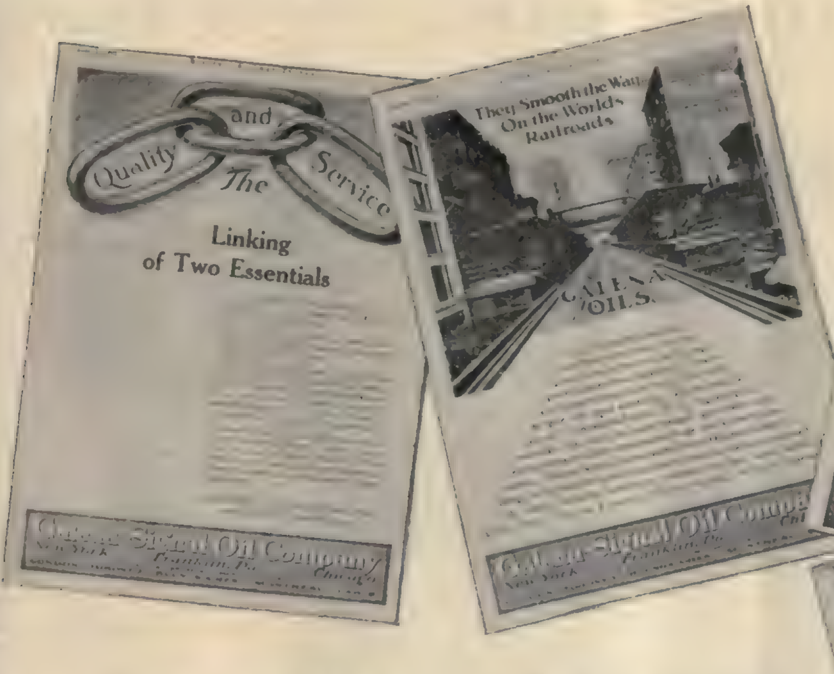
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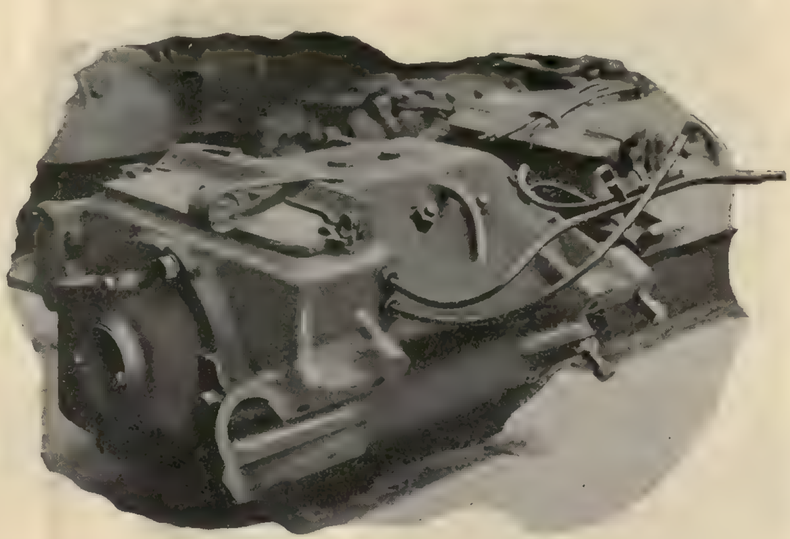

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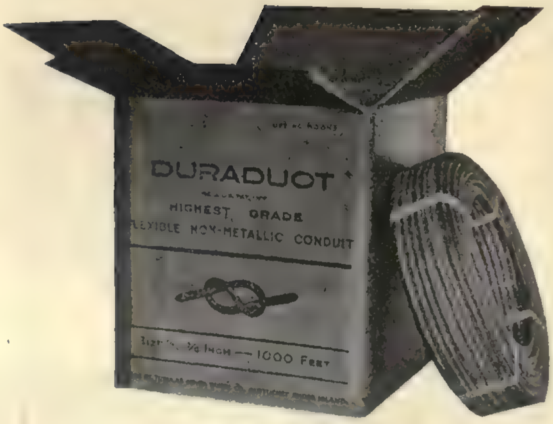

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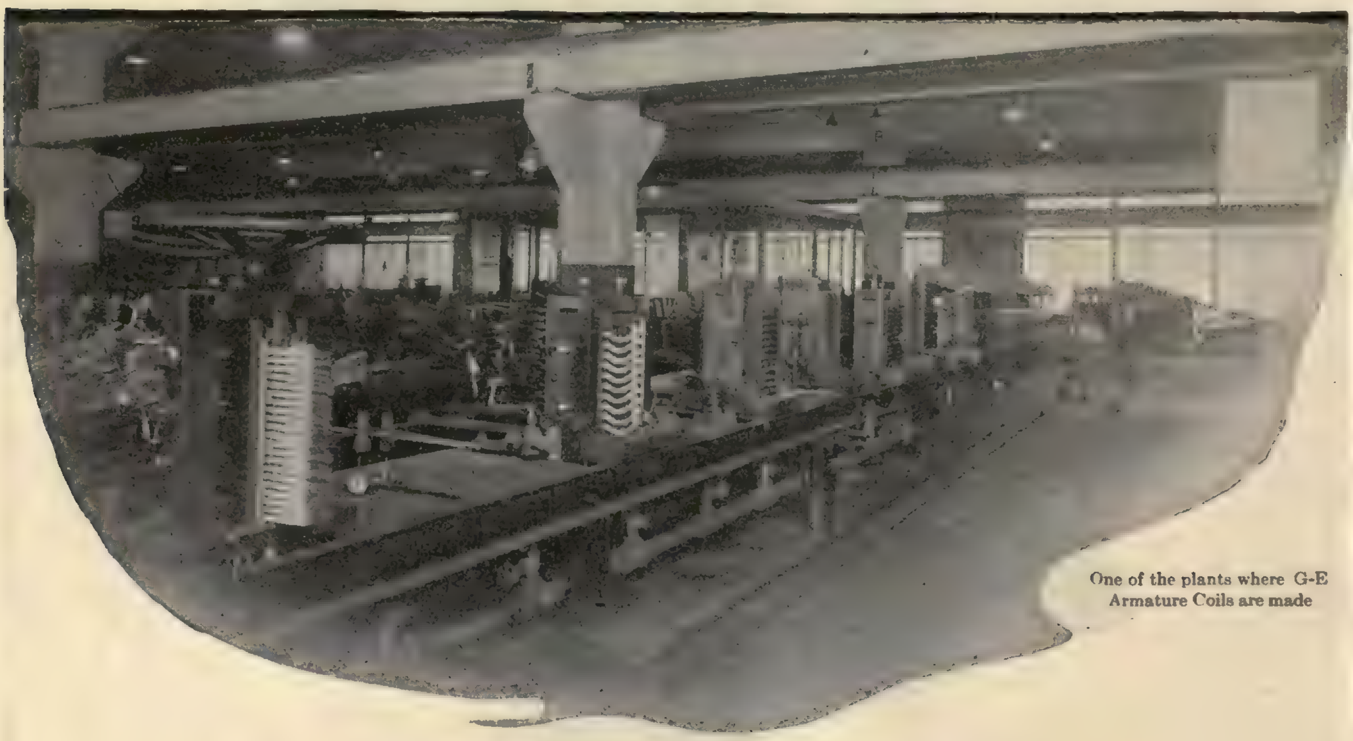

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The Year 1921, Legally and Financially

THE year 1921 promises to bring with it many problems, particularly from the legal and financing standpoints. Forty of the forty-eight state legislatures will be in session and will doubtless take up a great deal of public utility and tax legislation, while the United States Congress will undoubtedly consider a revision of the excess profits and income taxes and of the tariff, the soldiers' bonus, etc. Hence, it may be expected that the legal departments of the electric railways and the legislative committees of the various associations will have a busy year. Their activities will not only be directed to assisting in the formulation of constructive legislation but to interpreting the tax laws that will be passed, both state and federal. It is needless to say, also, that the pending of all of these tax matters, and the likelihood of other enormous government bond issues to cover a soldiers' bonus, etc., will have a marked effect on the ease with which new issues of electric railway securities may be floated. Yet the improving financial condition of the electric railways, resulting from increased earnings and the tendency toward lowering expenses, will have a very helpful counter-effect.

Experience Keeps a Dear School

SEATTLE is up against it. In fact, the city has been up against it ever since it took over the local railway lines of the Puget Sound Traction, Light & Power Company a year ago. The privately owned road was up against it before that. Denied adequate measures of relief, the owners sold out ~~to the city~~, then under Ole Hanson as Mayor. Ole Hanson was for municipal ownership then. He has since seen a great light, but that doesn't help Seattle now.

The story is an interesting one and has many angles. In fact, it has too many angles and lessons to be dealt with adequately except at considerable length. One series of facts, however, stands out in bold relief. The city now is $500,000 behind in its operation of the municipal railway; at the end of 1921, if the present fare is continued, there will be an estimated deficit of $1,610,452. Employees are being paid by warrants salable now at a discount or payable at some indefinite future date when the city has sufficient money to meet them. The Seattle ticket fare is now 6¼ cents. The cash fare is 10 cents. The latest proposal is to make the ticket fare 8⅓ cents. If that is done and traffic remains constant it is estimated—estimated, mind you—that it will take two years to wipe out the present deficit.

Seattle was considerably a war bride. The heavy hand of the post-war period has now descended upon it. The city is slowing up. Estimates based on the future are decidedly dangerous. Therefore, Mayor Caldwell has preached caution. He is not so sure that the panacea for Seattle's poor showing is in advancing the fares. In consequence of this and other happenings the matter of an increase has gone over for a time. In this move Councilmen were outgeneraled who were appalled at the financial outlook and desired to make the advance in fares effective at once. The lesson of Seattle's failure with municipal ownership and operation is plain to other cities. Those disposed to disregard it can hardly expect to escape a similar experience. They tempt fate.

Keeping Up the Load Factor in Operating Machinery

A GREAT DEAL has been heard of late regarding the matter of "load factor." The term is applied in all kinds of connections, always with a view to expressing the idea of continuity of use of something or other. There is one application in which particularly the term needs to be used and the principle of getting high load factor needs to be worked out. This is in connection with outdoor and indoor machinery, large and small, but particularly large.

There are mechanical operations which have to be performed over and over again, for which machinery is ideally adapted. A machine will save labor and time, and if it does not cost too much in proportion to the work to be done it ought to be used. We are in the habit of rating a machine by the time in which it will save its cost, a very rational way of looking at the matter. Thus, "that tie tamper will buy itself in our work in six months," "that concrete mixer will save its cost in a single season," etc. We cannot understand why managements are sometimes so slow in giving their maintenance department what they need in the way of machinery when the savings to be made seem so apparent.

But there's another side to this question, one that possibly looms large in the manager's mind, namely: Can the device whose purchase is recommended be kept at work sufficiently continuous to enable it to produce the savings of which it is undoubtedly capable? In justice to the device itself, to the manufacturer behind it and to the manager who is asked to buy it, this question ought to have careful consideration. What will the machine save per year, and not per hour, is one question. Another is, can it be used in more than one line of work in case it is not needed all of the time in the job for which it is to be primarily purchased? In other words, how adaptable is it? Proper attention to questions like these will result in the more intelligent purchase or construction of machines and in their more efficient use. Ultimately it will cause the use of more machinery, because each piece in use will be an advertisement for machinery in general.

Having purchased a machine, the operator's next job is to utilize it properly; to keep up its operating load factor. This is a matter of dispatching. Manufacturers have worked this out to a science; in an up-to-date factory very few idle machines are seen. They have to work or get out to make place for more useful tools. There is no reason why the same principle cannot be applied on electric railways even more than it has. All that is needed is a little system. Some time ago we described how the New York State Railways, Rochester Lines, kept track of the movement of their line trucks. This work was done by the telephone operators in the chief engineer's office. It would make an interesting duty for some clerk in each main department to follow the same procedure in connection with all important equipment on the track or the line, and in some cases even in the shops. A graphical record of performance, such as is kept in power plants and substations, would be very instructive in this connection.

Competition and Monopoly

COMPETITION is an industrial stimulus and an antidote for stagnation in development when considered from a certain standpoint and history shows that competition was the cause of developments which led to the monopoly operation of public utilities.

The railway industry is essentially best administered as a monopoly in each transportation district, but competition is never eliminated by theoretical statements. The successful monopoly must advance and develop at such a rate as to ward off and anticipate competition and, in the event of a new invention, must use it in a constructive manner to better its situation as a monopoly furnishing public service.

The Bell system did not give up when the automatic telephone was introduced; it developed the automatic instead of condemning it and adopted the policy of owning it and trying it out. Having been proved practicable, it is being put into operation and will gradually replace the older types as the existing installations depreciate. This organization meets competition and increases its monopoly control by doing its own inventing and developing in telephony and at the same time furnishes service with its existing equipment and protects its capital investment. It maintains itself by being so progressive that competition has no chance to exist.

The street railways were forced to compete with the steam roads and stages in their early history in order to exist. They did not suffer under such a handicap, but developed into our existing systems. Now the street railways are faced with a new competitive situation due to the development of the automobile and the motor bus. The railways cannot solve this situation by using destructive criticism, but they can master the situation, as they have mastered many previous situations, by using constructive methods. They hold the key to the problem in that they know and have experience in transportation.

If the motor bus is a coming transportation agency the street railways should own and develop it; if the street can be redesigned to meet any better the present and growing traffic changes the street railways should do it; if trackless trolleys have a place, the street railways should find it. There never was a time more auspicious for development in transportation through constructive measures, and we look for the street railways to show the same type of progressive management in the handling of competition in transportation as is exhibited by the Bell system in the telephone field.

Power Economy Outside the Power House

AN ELECTRIC railway system is a complex organization at best and departmental heads are apt to grow so that they view their own functions in the organization with a distorted and sometimes narrow perspective. The power department in such an organization is probably the most independent in its operations and furnishes examples to illustrate the complexity of a railway manager's duties. We recall an incident in which a railway power house superintendent had the temerity to request the management to adjust train schedules so as to operate the power units at maximum economy. But this man is no more open to criticism than many railway managers who forget all about the power department after it is once organized.

Economical power production is a managerial rather than a design function. There are no fixed constants in power production, and the purchase and installation of modern equipment under the direction of a competent inside power house operator will not relieve the railway manager of all power responsibilities. The power-house expert can be depended upon to get the most out of the fuel delivered to him when used in connection with the installed equipment, but there is an inherent tendency for him to view his job with the internal operating perspective of the combustion and equipment engineer. Often more money loss occurs before fuel reaches the power house, or after the electrical energy leaves the power house, than all internal economies will save. It is in the broader field of purchase of fuel and use of the power that the touch of the manager should be felt.

A great opportunity for economy and one requiring great attention is that of fuel purchase. We hope to see the day when fuel will be more largely purchased on a B.t.u. basis, and when all purchasing agents will discover that all is not coal that is black. In general, railway power producers pay too much for coal and too little for B.t.u. This subject was discussed more in detail in the issue of Oct. 9, page 701.

Then again the wrong kind or size of coal may be purchased. An equipment in the power house designed for a certain size and type of coal for efficient operation labors under a heavy handicap when any and all kinds and sizes of coal are used. If the coal is too large, air holes and thin spots may occur in the fuel bed; if the coal lumps are too small, the draft apparatus may be too limited; if clinkering or coking coal is used, then other troubles may arise. Power-house equipment and labor both operate inefficiently when variable types and sizes of coal are used to produce power. A close cooperation between the power-house superintendent and the purchasing agent is essential to efficient operation.

There is also room for managerial activity in regard to the use of power after it has been produced. The St. Paul electrification furnishes a startling innovation in this respect—the train dispatcher modifies schedules to control peak demands of power. Of course the inducement for such a policy is the financial clause in the power contract, but it stands to reason that the power company would not offer the inducement unless it saved money. This idea applies in detail only to specific cases, but modern power plants are so numerous that questions of peak load power transfer arrangements, supplementary stations, feeder size and location and schedules offer a fruitful field for economies in power entirely aside from internal economies in the local power plant.

Electric Steel Offers Possibility of Lighter Equipment

ANY improvement in the strength of steel results eventually in a decided gain to the railway industry. The war gave a great impetus in this direction through the development of alloy steels and steels made in the electric furnace. The results of some tests on electric steel which have recently been published indicate that its properties approximate those of crucible steel and that it is superior in tensile strength and torsion to the best open-hearth steel. This is true, even if the steels have the same chemical specifications. It is claimed that the cost is not far in excess of that of open-hearth steel.

The automobile industry has quickly grasped the opportunity to reduce weight by using electric steel, and there would seem to be a considerable field for such a material in the railway industry, particularly in the lightening of rolling stock parts. For axles, electric steel will, according to reported tests, stand twice the torsion of open-hearth steel. It is also reported to suffer less fatigue under shocks.

There will be a time element in such a change. The output of the material is at present somewhat limited, but it is now on the market and the development of additional electric furnace capacity appears to be considerable. The initiative for its use should come from the railway operators, as they are the men to benefit from the reduction of weight of the equipment.

Staten Island Has a Scandal

NEW YORK'S Mayor is horrified. It may not matter that New York is horrified at its Mayor. That is something else again. With it the Mayor has nothing to do. From being interrogated in the building graft scandal, the Mayor has turned to questioner by proxy in a scandal which he has unearthed through Grover Whalen, commissioner of plant and structures. It is a small matter intrinsically, but it involves a big issue. Over on Staten Island, where the city is now operating one-man cars at a 5-cent fare, it was recently discovered that one of the motormen-conductors was a nickel snatcher. This was too much for the auburn-haired denizen of the City Hall, so Mr. Whalen was assigned to bring the offender to book.

Nickel snatchers are not wanted on the city lines. Of course not. How can the city be expected to make a success of its municipal railway undertaking if nickel snatching is not stopped? It needs every nickel it can get. This particular offence was not so grave; it was the cumulative effect of the thing that was to be feared. Since the arrest of the offender it is said that the earnings of the road have increased. How could they very well do anything else? If there is any place in the world where a nickel would be missed it is on this Staten Island road. The miscreant who is charged with pinching nickels there might have known this if he had given the matter more than a moment's careful thought. Anyway there was a technical error in the form of the complaint. Proceedings have been adjourned until Dec. 21. Justice will then probably deal sternly with the offender, if the court does not accept the defendant's plea that he hadn't had time to ring up the fares.

What does it matter if a thousand people are robbed in a day in the great city so long as the fellow on Staten Island who steals a nickel from the city is brought to justice and is held up to his associates as an example of what may befall them if they become careless in their handling of other people's money.

Physical and Mental Examination of Prospective Employees

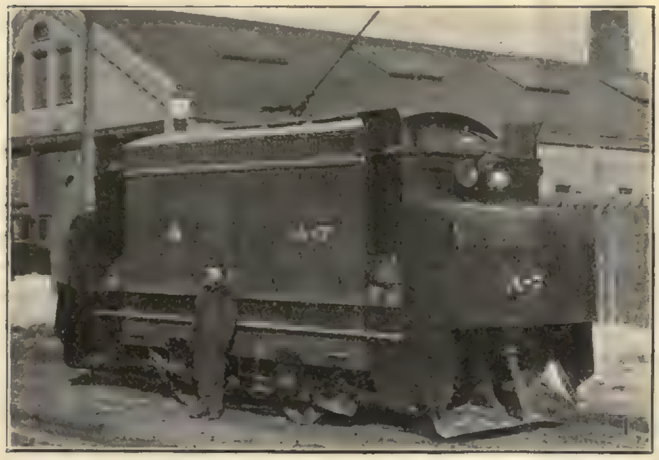
A RECONSTRUCTION period is at hand for electric railways, and it is suggestive of a new sentiment that the American Electric Railway Transportation & Traffic Association should have appointed a committee on personnel which will prepare a report for the next convention on the best methods of hiring and training employees. This subject has been investigated by several committees in past years, but it was dropped during war time when the problem was not so much how to select and train an efficient force as how to secure men of any kind to keep the cars moving. The turn in the tide is now emphasized by the constantly growing number of men applying for positions with electric railway companies, particularly for platform service. These companies are also in a situation where undesirable employees may be weeded out without worry about the possibility of replacements. It is natural, therefore, that the industry through its association should resume its study on the selection and training of employees.

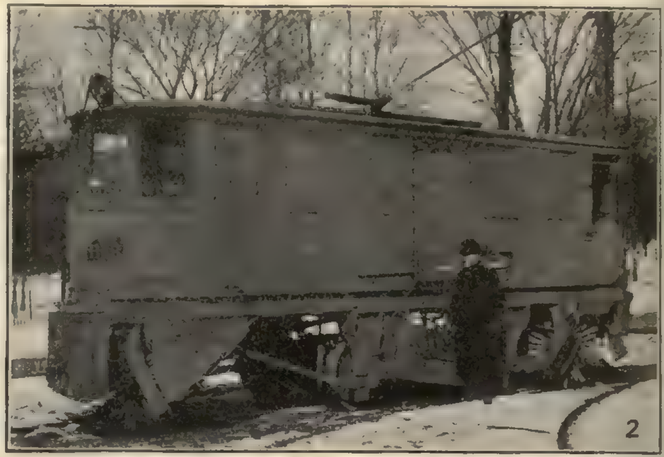
Another factor which is behind the demand for a revival of this particular committee is the growth of employers' liability legislation. Preventive measures in the selection of men physically fit should lessen the burden which companies are facing in the way of compensation for employees injured or killed in hazardous occupations.

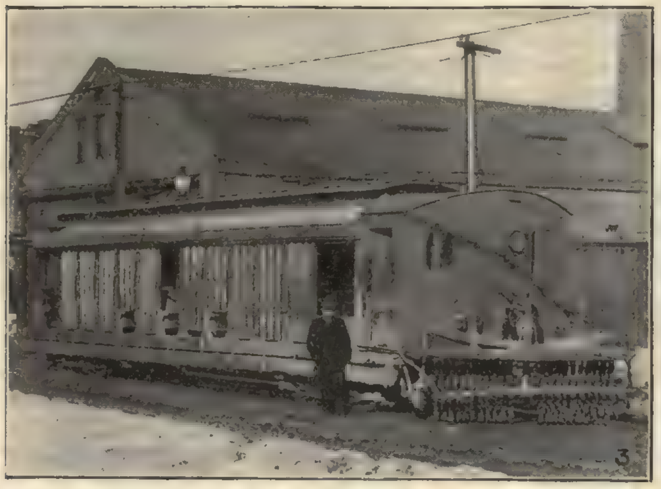
Inquiry among industrial plants has indicated that we have only begun to realize the possibilities of the proper selection of workmen from the physical standpoint and that we have just scratched the surface from the mental standpoint. Too many electric railways have been content with a perfunctory investigation as to the physical condition of applicants for train service, and only those employers who have turned this task over for serious study by a capable doctor have begun to get their reward in the weeding out of poor material from applicants at first sight suitable for the work. A man's mental alertness, soundness of judgment and efficiency or skill in his occupation depend to a large extent upon his physical condition. He cannot respond quickly to an emergency without being sound physically. He may not be actually crippled or afflicted with a serious ailment, but the continual consciousness of discomfort resulting, for instance, from fallen arches may easily be a contributing cause to a serious accident. Experience in the weeding out of recruits for our great national army showed how large a proportion of the youth of the country was not up to a proper physical standard.

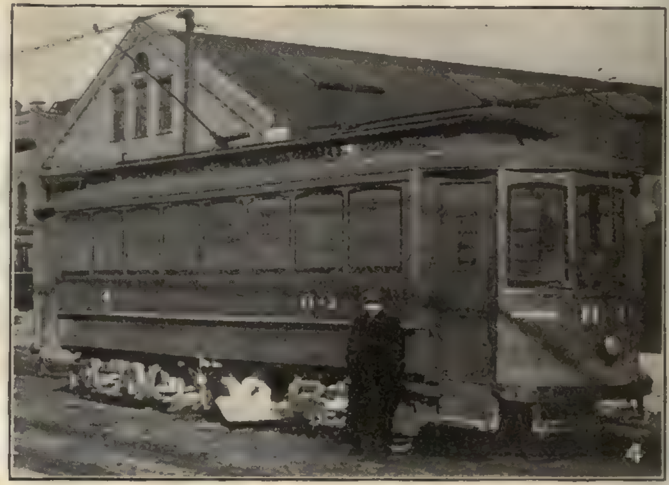
Psychological tests for prospective employees have never been developed to any great extent in the electric railway field, although many industrial establishments have reported good results from experiments of this kind. The committee on personnel might well look into this feature of selective employment methods because sluggish mental habits, not always detected by physical examination, may easily lead to disastrous accidents or unfit an employee for his duties on the cars. We believe there is a fertile field for development in this branch of employment methods.

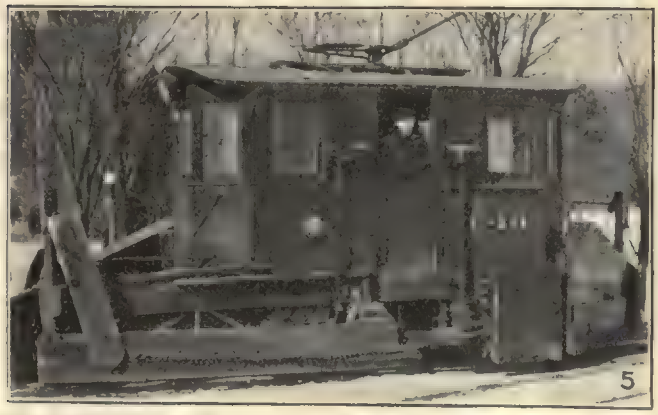
Snow-Fighting Equipment of the International Railway

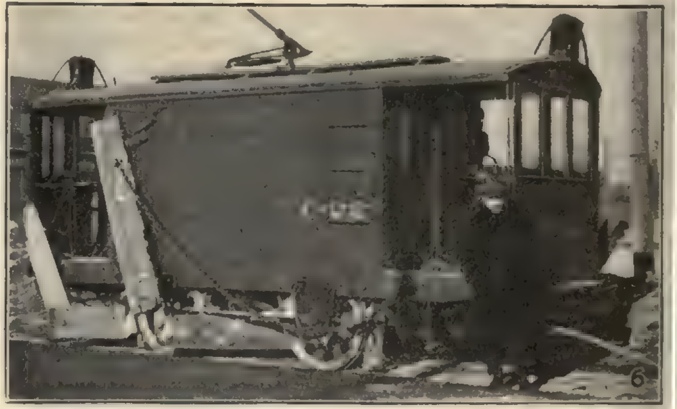


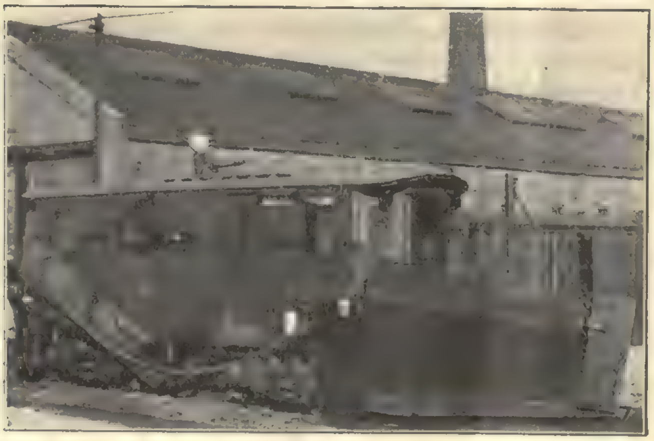












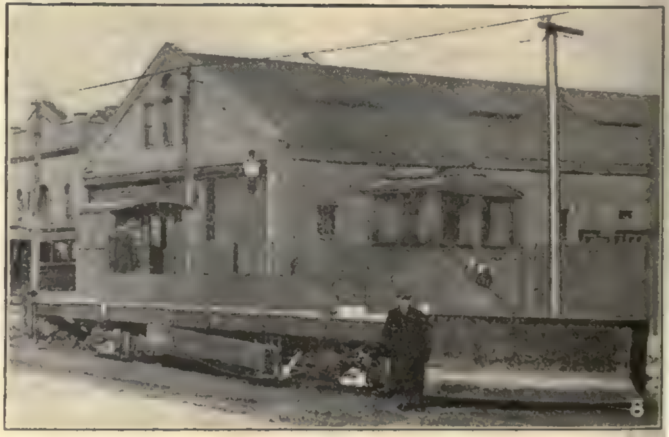


Fig. 1—Rotary snowplow. Fig. 2—Single-truck snow-sweeper. Fig. 3—Combination open car and sweeper. Fig. 4—Ice digger.

Fig. 5—Single-truck shave plow. Fig. 6—Scraper plow. Fig. 7—Double-truck shave plow. Fig. 8—Combination flat car and sweeper.

Does It Pay to Prepare for Winter Operation?

Some Facts and Figures Compiled from Records of the International Railway Would Indicate an Affirmative Answer—What Do Your Records Show, Mr. Manager?

By JOHN S. DEAN
Railway Motor Engineering Department, Westinghouse Electric & Manufacturing Company

THIS question, which is of vital importance, has been the subject of much discussion during the past year and should be given further careful thought and consideration by all operating men on electric railway properties located in the snow belt. To help crystallize this thought into some definite plan of action, the following data have been obtained through the courtesy of J. H. Hulme, superintendent of equipment International Railway, Buffalo, N. Y., and are submitted to show what can be accomplished by systematic preparation and planning to combat the severe operating conditions incident to the winter season.

The city of Buffalo, N. Y., with a population of 500,000 people, is on the 43-deg. latitude parallel and the Weather Bureau reports show that for the past thirty years this region has received an average of 75.9 in. of snow each winter, with a maximum of 126.4 in. (1909-1910) and a minimum of 22.4 in. (1889-1890). The maximum snow for any one month was 46.6 in., which occurred during the month of January, 1891. Operating under these climatic conditions, the local railway company has learned its lessons from past experience.

The International Railway Company, which controls all of the city railways and all but two of the interurban lines entering the city of Buffalo, operates 230 miles of city and 204 miles of suburban and interurban tracks. To handle its traffic requires on the average about 880 cars, the overhauling, maintenance and inspection of which are taken care of at one main shop, located in the section of the city known as Cold Springs, and nine operating barns conveniently placed at strategic points along the system.

PREPAREDNESS THE WATCHWORD

This railway company, realizing the importance of keeping the cars in good operating condition to reduce pull-ins to a minimum and make it possible to maintain schedules during the severe winter season, is a firm believer in preparedness and has worked out a few basic principles which have been found to be very beneficial in connection with the operation of the road. These include keeping barns and pits clean, well lighted and comfortable, making systematic and regular inspection and overhauling of all equipments, keeping an available supply of spare parts on hand, dipping and baking armatures, both old and new; protecting motors and detail equipment by suitable covers and guards, maintaining ample snow-fighting equipment, overhauling all snow-fighting equipment before winter and providing trained snow-fighting crews for all available apparatus.

TABLE I—SNOW-FIGHTING EQUIPMENT USED BY INTERNATIONAL RAILWAY

Total Cars	Class	Types of Apparatus	Single or Double Trucks	Driving Motors per Car, Hp.	Total Weight, Tons	Aux. Motor Broom or Fan, Hp.	Shown in Fig. No.
3	A	Rotary plow	Single	2–25	12	2–35	1
3	A	Rotary plow.	Single	2–30	12	2–35	1
10	B	Sweeper	Single	2–50	10	1–40	2
4	600	Combination open and sweeper	Double	4–50	21	1–60	3
1	H	Ice digger............	Double	4–40	21¼	1–40	4
22	C	Shear plow	Single	2–50	13	....	5
12	C	Scraper plow..........	Single	2–30	9	....	6
3	D	Shear plow.........	Double	4–50	30	....	7
1	E	Combination flat and plow..	Double	4–50	22	....	8
3	E	Combination flat and plow...............	Double	4–40	22	....	8

Up to the present time this company has found that with the snow-fighting equipment recorded in Table I it has been able to keep the right-of-way cleared of snow for regular traffic. This equipment is distributed over the system, as shown in Table II. All of the cars are mounted on 33-in. wheels and equipped for double-end operation.

METHOD OF ATTACK OF GREAT IMPORTANCE

Too much importance cannot be laid upon the methods used in fighting snow on railway properties. This company has adopted the following fundamental essentials in connection with its snow-fighting program:

Under no conditions are passenger cars used to buck snow. At the first sign of a snowstorm each snow-fighting equipment is manned with a trained crew of three men, who receive a special rate of pay for this service. They are available for immediate action and are ordered out on the road shortly after the snow begins to fall.

A dispatcher located at a central office keeps in telephonic connection with all carhouses and directs the operation of the snow-fighting equipment and records all data on sheets similar to Table II, which gives a complete log of each snowstorm.

Immediately after each storm one of the first things done is to repair all breakdowns and get equipment in good condition for the next snowfall. A reserve force is kept available to prevent working the regular men to the breaking point.

To obtain some definite information as to the equipment failures experienced by this company during the past winter season, the weekly trouble reports were carefully examined and the percentage of crippled cars and of armature failures for each week, covering a period of nine months from September, 1919, to May, 1920, were tabulated. In addition to the above, the maximum snowfall for the above corresponding nine months was obtained from the local Weather Bureau records. These figures were plotted and are shown in an accompanying graph.

WHAT THE RECORDS SHOW

By referring to this graph several outstanding points are to be noted as follows:

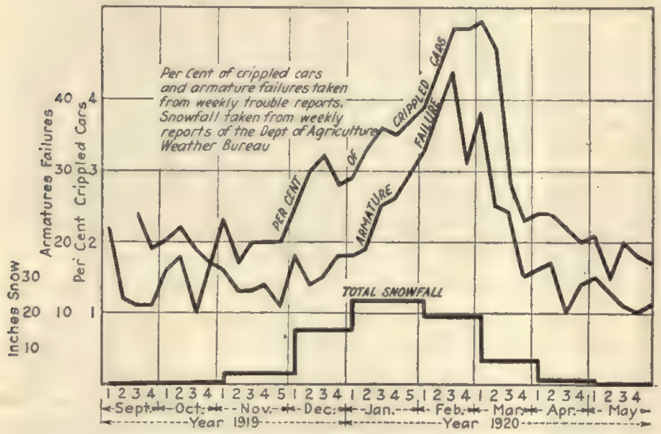
1. The maximum percentage of crippled cars for one week is 5.1 per cent. The average number of cars in service over this period was 880.

2. The maximum number of armature failures for one week is forty-four. With 3,180 armatures in service, this figures 1.4 per cent failed, which is a very creditable record. During this same period some companies operating in the New England territory reported armature failures for one week as high as 9.3 per cent.

3. The peaks on the curves show that the percentage of crippled cars and armature failures lagged about one month behind the peak of the curve representing the snowfall. This condition shows that failures occur about one month after the equipment has been subjected to severe operating conditions during the heavy snowfall.

4. Although not shown graphically, one can picture in his own mind, by drawing upon his imagination while studying these curves, an available supply of cars, schedules being maintained, normal traffic conditions and satisfied patrons.

In reviewing the above, it is only fair to state that certain local operating conditions such as wide streets, few heavy grades and the distribution of traffic on this system are favorable to this company and no doubt responsible for a certain percentage of this good showing. However, we should not lose sight of the fact that thorough preparedness and organized team work have played their part in producing these results and are entitled to consideration and a large share of the credit.



RELATION OF EQUIPMENT TROUBLES TO SNOWFALL DURING WINTER 1919-1920

The spirit of appreciation on the part of the officials of their men is shown by the fact that on one occasion when a minor complaint relating to some of the equipment reached the ears of one of the higher officials, instead of censuring the operating official responsible for this line of work he intimated that probably his men were pretty well tired out from the good work recently done in keeping the road operating smoothly during the past severe winter season. He suggested that a banquet be given them in recognition of their services. This affair was made very informal and attended by the officials and the men and was staged very successfully. All expenses were borne by the company, and it was voted a decided success, as it created a better understanding between the men and the officials.

The operating officials of this road, fully awake to the importance of this work, and believing it possible to improve their record of the past year, have been carefully studying the weekly reports of equipment failures and car pull-ins, with the idea of reducing them to a minimum. In connection with this, they have been on the alert to better their snow-fighting facilities and have in mind the following additional improvements: Dipping and baking of completely wound motor frames, standardizing the type of cleating for motor cable leads, improving methods of babbitting bearings, changing from cast-iron to cast-steel wheels on all snow-fighting equipment, adding two new Russell type snow plows, three new combination open-car type sweepers[*] and one new ice digger to snow-fighting equipment arranging crews operating snow-fighting equipment s as to be under the direct supervision of the mechanica department.

TABLE II.—RECORD OF DISTRIBUTION OF SNOW-FIGHTING EQUIPMENT

Started snowing 7:15 a.m. Date 12-29-19.
Stopped snowing 6:00 a.m., 12-30-19.

Carhouses	Plows	Sweepers	Time Out	Time In	Remarks
Cold Spring...	C-2	....	3:00 a.m.	8:00 a.m.	Light circuit.
	C-3	....	1:30 a.m.	9:00 a.m.	O.K.
	C-11	....	3:30 a.m.	9:50 a.m.	O.K.
	C-30	....	....	....	
	C-31	....	3:00 a.m.	3:30 p.m.	Broken wing hook
	C-43	....	1:30 a.m.	9:40 a.m.	O K
	D-3	....	2:30 a.m.	1:30 a.m.	O.K.
	E-24	....	11:45 p.m.	11:30 a.m.	Grounded field No. 2
	A-4	....	....	....	
	A-5	....	....	....	
	A-8	....	....	....	
	.....	B-7	12:15 a.m.	9:30 a.m.	Broom worn out No. 2 end
	.....	669	12:00 M.	8:30 a.m.	O.K.
	.....	685	12:00 M.	8:30 a.m.	O.K.
Forest.......	C-14	....	1:30 a.m.	3:40 a.m.	Wing broken
	C-19	....	3:50 a.m.	1:40 a.m.	O.K.
	C-25	....	....	....	
	.....	B-3	12:25 a.m.	8:00 a.m.	O.K.
Hertel.......	C-5	....	1:15 a.m.	4:15 a.m.	Grounded field No. 2
	C-9	....	3:00 a.m.	8:30 a.m.	O.K.
	C-16	....	2:10 a.m.	6:30 a.m.	Brakes found O.K.
	C-22	....	5:15 a.m.	9:00 a.m.	O.K.
	C-28	....	5:30 a.m.	7:00 a.m.	O.K.
	E-21	....	5:15 a.m.	10:15 a.m.	O.K.
	D-1	....	12:30 a.m.	12:30 p.m.	O.K.
	A-3	....	....	....	
	A-6	....	....	....	
	.....	665	1:35 a.m.	8-25 a.m.	Broom worn out
	.....	674	12:30 a.m.	7:15 a.m.	O.K.
Walden	C-15	....	5:45 a.m.	10:15 a.m.	O.K.
	C-17	....	2:00 a.m.	9:20 a.m.	O.K.
	C-20	....	....	....	
	.....	B-2	12:30 a.m.	9:10 a.m.	Broom worn out No. 1 end
Broadway....	C-1	....	....	....	
	C-4	....	1:40 a.m.	6:55 a.m.	Broken chain
	C-7	....	1:30 a.m.	7:45 a.m.	Broken chain
	C-24	....	5:20 a.m.	8:30 a.m.	O.K.
	C-26	....	....	....	
	C-29	....	4:30 a.m.	9:00 a.m.	O.K.
	C-40	....	1:00 a.m.	11:30 a.m.	Broken chain
	E-23	....	....	....	
	.....	B-5	11:55 p.m.	10:30 a.m.	Broom worn out No. 1 end
	.....	B-6	12:30 a.m.	7:30 a.m.	Broom worn out No. 1 end
	.....	B-10	12:00 M.	7:20 a.m.	Broom worn out No. 1 end
Seneca.......	C-8	....	2:00 a.m.	6:55 a.m.	O.K.
	C-18	....	2:50 a.m.	9:15 a.m.	O.K.
	C-21	....	....	....	
	C-23	....	....	....	
	E-22	....	4:55 a.m.	11:15 a.m.	O.K.
	.....	B-1	12:25 a.m.	6:35 a.m.	O.K.
	.....	B-8	12:50 a.m.	7:15 a.m.	Broom worn out No. 2 end
Lockport.....	C-30	....	7:50 a.m.	11:30 a.m.	O.K.
	C-41	....	....	....	
Niagara Falls..	C-10	....	2:10 a.m.	3:45 p.m.	O.K.
	C-13	....	12:00 M.	10:00 a.m.	O.K.
	D-2	....	....	....	
	A-7	....	....	....	
	.....	B-9	....	....	
Whirlpool....	C-38	....	5:30 a.m.	3:00 p.m.	O.K.

Signed N. PERSONS

THINGS EVERY COMPANY CAN DO

It will be granted that the solution to this problem is not the same for all railway companies. However it is reasonable to assume that a few fundamentals ca be segregated and applied to practically every railway company operating within the zone of snow. The most important of these are as follows:

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[*] This is an attachment which is applied to standard open ca and was described by Mr. Hulme in the ELECTRIC RAILWAY JOU NAL, Jan. 18, 1919.

Maintain comfortable, clean and well-lighted carhouses and shops.

Provide for regular and systematic inspection and maintenance of equipment.

Keep motors and detail equipment well protected by suitable covers and guards.

Dip and bake armatures.

Do not use passenger cars to buck snow.

Provide adequate snow-fighting apparatus.

Take immediate action in connection with fighting snowstorms.

No one will question the fact that the things outlined above will cost considerable money and require a large expenditure of time and energy to put them into effect, but it should not be ignored that where such essentials have been neglected, the experiences of the past few winters recall some appalling results. It is no secret that many railway companies spent enormous sums of money trying to keep their roads open and cars operating for a few months during the past winter. The results at best were very unsatisfactory to both the operating company and the traveling public. It is safe to say that if half the money spent for these emergencies had been used in systematic preparation to meet such conditions the results would have been very much more gratifying. Bearing these things in mind, each operator should ask himself this question, "Does it pay to prepare for winter operation?" then reason out some practical answer and get busy immediately.

Paints Used by Electric Railways

Some Fundamental Requirements for Protecting Railway Equipment and Structures from Deteriorating Influences and Producing a Pleasing Appearance

BY NORMAN LITCHFIELD

THE use of paint by electric railways naturally falls into two groups, the one for buildings and structures and the other for passenger cars. Such freight cars as are used belong, on account of the character of the paint used, in the building and structures group. There are also two fundamental reasons for the use of paint, the primary one being to protect equipment and structures from the deteriorating effect of the weather and the secondary one being to present a pleasing appearance. The latter reason is really the controlling one in connection with passenger cars, because it is apt to be the paint which forms the basis of the public's judgment on the company's property. Gears may be noiseless, flat wheels may be unknown, detentions may be few, but if the cars and structures need a coat of paint the property looks neglected, and the traveling public forms its opinion accordingly.

In the achievement of the desired results it is of course essential that an economical procedure be pursued, the word "economical" being used in its true sense, and not as "cheap." Methods of painting and the materials to be used are usually decided on by the executive, but often they become the concern of those whose judgment is biased by favoritism, or at least affected by a lack of knowledge of what constitutes a durable protective covering. The whole subject of painting is furthermore one which was but little understood until a comparatively short time ago, and even now is undergoing considerable development. It is therefore difficult to form a correct judgment and it still remains a highly technical subject. Therefore, whatever remarks are made herein should not be taken as intimating that the author feels that any specification, in itself, can replace integrity, experience and skill on the part of the manufacturer. The making of paint is such a complicated process that it calls pre-eminently for these qualities. There are, however, a few fundamentals that the user may keep in mind to his advantage, and while all of these are well known to the chemist it has been the author's experience that they are not generally recognized by users.

To begin with, it is absolutely essential that the article to be painted should be clean and dry, for no paint, no matter how high its qualities, will hold over a dirty or wet surface. Methods of cleaning may vary all the way from simple wire brushing to "pickling" or sand-blasting. For different objects and materials each has its advantages and the more elaborate methods necessarily add considerably to the cost and lessen production. These facts must be borne in mind, for it is doubtful whether such methods as sand-blasting will pay in many instances. A questionable instance is that recently recommended by the committee on standards of the equipment painting division of the American Railroad Association. This committee said "that the new steel (freight) car upon completion of construction should have the exterior thoroughly cleaned and prepared by sand-blasting." As before stated, such a procedure would add considerably to the first cost of the car and except for thin sheets this seems hardly justifiable. So the user must decide as to how good a preparation his material needs before the application of the priming coat. One thing which cannot be stated too positively is that the surface must be dry. Any object which is wet or "frosted" will not long retain its coating and it is well to recognize the fact at the outset.

PIGMENTS CAN BE DIVIDED INTO TWO GROUPS

Having thus given some consideration to the surface of the material, it then becomes essential to have some understanding of just what a paint is. A good definition is that found in a series published by the American Society for Testing Materials: "Paint is a mixture of pigment with vehicle intended to be spread in thin coats for decoration, or protection, or both; pigment is the fine, solid particles used in the preparation of paint and substantially insoluble in the vehicle; vehicle is the liquid portion of a paint."

From a protective standpoint the priming coat is of the utmost importance. The pigments used in primers generally fall into two groups: (1) Oxides of lead, zinc and iron and (2) carbon and graphite. Mention is not made of the salts of chromium in the foregoing, on account of their expense.

Of the oxides of lead, the one with which users are most familiar is that known as "red lead," which consists generally of the sesquioxide (Pb_3O_4) with a certain admixture of litharge (PbO). It has for many years been considered one of the finest protective coatings for steel which it is possible to obtain.

"White lead," or "corroded white lead," consists of basic carbonate of lead. It is used largely as a priming coat for wood, either with or without tinting. "Sublimed white lead" is a mixture of the sulphate and oxide of lead. "Sublimed blue lead" is a mixture of lead and zinc compounds with some carbon and lead sulphide. Both the sublimed white lead and the sublimed blue lead are made by a smelting process, which it is claimed give them an ability to withstand heat and gases which attack other pigments.

Among the zinc pigments the chief is "white zinc," or zinc oxide. Another important one is "lithopone," which is a compound of sulphide of zinc and sulphide of barium.

The chief iron pigments are the red and brown oxides, which are both different varieties of iron sesquioxide or ferric oxide (Fe_2O_3). Carbon and graphite are both used in the uncombined state, the carbon pigment being formed by burning either petroleum or natural gas. Graphite is found as a mineral, and in addition an artificial graphite is now being made. To lessen the cost of the lead paints it is quite customary to substitute a certain amount of "barytes" (barium sulphate) for some of the lead salts, and these are not objectionable if not used in too great quantities.

In addition to the true pigment, experience has shown that to make satisfactory paint a certain amount of "inert" material must be added; that is to say, a material which does not combine with or affect the other material in any way. One authority gives as the reason for this that it provides particles of different size, which thus fill up the voids better, just as for the same reason aggregates of different size are used in the manufacture of concrete. These inert materials are generally silicious in their nature, such as silicate of magnesium, commonly known as "asbestine" silica, and aluminum silicate (china clay). They are in no sense adulterants, for, as before explained, experience has shown that their presence is necessary.

RUST PREVENTION IS ESSENTIAL FOR STEEL

It has long been recognized that some pigments offer a greater resistance to rust than others, and a great deal of attention has been given this subject in the past few years, numerous experiments having been made both in the laboratory and the field. An elaborate service test was conducted by the paint committee of the American Society for Testing Materials over a period of six years, commencing in 1908 and terminating in 1914.

In this test steel panels were carefully prepared with as perfect a surface as possible and exposed to the salt air of Atlantic City, N. J. A system of credit points was worked out covering the various qualities of the pigment, a total of ten being considered perfect. The panels were examined by each member of the committee before painting, and at intervals thereafter, each inspector making and recording his own observations separately. These individual observations were published each year, and at the close of the six years' test an average was obtained.

The composition of the pigments is given on page 79 of the A. S. T. M. Proceedings for 1910. The pigments were each ground in quantities given in table form in the report, in two-thirds of a gallon of raw linseed oil and one-third of a gallon of boiled linseed oil. No drier was included because of the unknown factor which would be introduced by the lead content of such drier. The final results are given on page 259 of the 1914 Proceedings and are as follows, ten being considered perfect:

American vermilion (basic lead chromate)	7.5
Sublimed blue lead	6.0
Burnt umber, zinc lead, etc.	5.5
Lamp black, graphite and barytes	5.5
Red oxide of iron with barytes	5.0
Carbon black and barytes	5.0
Chrome green	5.0
White lead and barytes	5.0
Zinc oxide and chromate	4.5
Willow charcoal	4.5
Red lead	4.0
Zinc chromate	4.0
Zinc and lead chromate	4.0
Magnetic black oxide of iron	4.0
Natural graphite	4.0
Artificial graphite	0.0

Perhaps the most interesting feature of the above list is the comparatively low rating of the red lead. The "comparatively" is used advisedly, inasmuch as it should not be understood that red lead is not a good primer, for it is, but simply that it does not stand pre-eminent, as once thought. Another interesting point is the high standing of the oxide of iron. It is this paint which is familiar to all as the dark red or brown freight car color. Later tests indicate that the iron oxides are very desirable primers, which seems quite reasonable from their kinship to rust itself. Another form of this pigment (iron oxide) has been familiar to all car builders and users for years as "metallic" paint, and its good qualities, known to all, are substantiated by the most recent tests.

In addition to the purely protective qualities of the pigments, there is the question as to whether the pigment will prevent or encourage the spread of rust under the paint film once a spot of rust has started. A pigment which prevents or discourages such spread is said to be "water inhibitive." Extensive experiments have been carried on to determine the relative action of pigments in this respect, and while too great faith cannot be placed on the results of "accelerated" tests, the fact seems to be fairly well established that there is a difference between pigments in this regard and that two of the pigments show marked characteristics, namely, blue lead, as preventing the action, and carbon, as stimulating it. For this reason it is considered that pigments other than carbon are more desirable for a priming coat, although carbon is still extensively and to a degree successfully used as a primer, and in any event is an excellent finishing coat.

Paint may be purchased mixed ready for use, but customarily it is obtained in a semi-paste form, which is thinned by the user to the desired consistency. The liquid portion of the semi-paste is or should be pure linseed oil, this being used generally raw, not boiled. Other oils are sometimes mixed with the linseed, but this is not considered the best practice.

For thinning the semi-paste paint the old and still the best practice is to use a mixture of linseed oil and turpentine with the addition of a suitable amount of drier or so-called "Japan." The cost of linseed oil and turpentine, however, has brought about the use of substitute materials, some of which have proved successful and are in general use by the most reputable paint manufacturers. Any substitutes used should always be mixed with a certain amount of linseed oil, and furthermore it is claimed that they to some extent add desirable properties which linseed oil alone will not give. Among the oils used are China wood oil, Soya bean oil and Menhaden fish oil. The thinner commonly used in place of turpentine is that known as mineral spirits, which is a hydrocarbon distillate (benzine).

While linseed oil itself has a drying tendency, it is customary to add a certain amount of drier or "Japan." Driers are composed of salts of lead, manganese or cobalt boiled in linseed oil and thinned with turpentine or a mixture of turpentine and mineral spirits. Resins or gums (not rosin) may also be used. Common salts entering into the composition are chiefly litharge (oxide of lead, PbO) and sugar of lead (lead acetate).

The above is the barest sketch of the constituents of paint, and when the story is told of the materials in the paint, but one-half of the total is known, as the dissection of paint is much like dissection of the human body, giving much information, but information of a type which is not of much value without a knowledge of the personality of the man, which is only known by intimate experience. So with paint. Probably no material is so difficult of analysis as paint, and in no material is it more necessary to have integrity of manufacture. The railway engineer must therefore convince himself, either by experience and study or by consultation with those in whom he has confidence, what type and composition of paint will be most suitable for his particular purposes, and then draw his specifications to suit, so that the reputable manufacturers may give him or his purchasing agents prices honestly made, all on the same basis and with the intention of furnishing an article which will meet the railway specifications and be compounded in the best manner known to the art. Let his chemist check it if he will, but it is certain that chemical analysis cannot take the place of experience and integrity in preparing and compounding a satisfactory paint.

SOME PAINTING SPECIFICATIONS FOR CARS

Standard specifications for paint are practically nonexistent, except as far as individual manufacturers or users are concerned. Hopes were entertained that as a result of the tests made by the committee on preservative coatings for steel of the American Society for Testing Materials that society would prepare standard specifications, but up to date the committee, we understand, has not felt that its work has progressed to the point where it can safely issue any standards on the subject.

Numerous railway specifications are extant, but as these are more or less private in character they are not generally published and are somewhat apt to reflect either the particular ideas of the chemist who prepared them or some especial condition or set of conditions prevailing on his road and not directly applicable to the general user.

The recent operation of the steam railroads by the United States Railroad Administration, however, caused the issuance of a quite complete set of painting specifications for freight cars, and it may be of interest to review the main features of these specifications.

Specification R80 covers the general requirements for paint and painting materials. In it provision is made for matching standard tints, submission of samples, etc. A variation of 2 per cent either way is permitted from the percentage of total pigment portion or total liquid portion. The individual constituents are also permitted to vary 2 per cent either way.

Specification R82 covers the painting of wooden box cars. This requires the outside wood work to be painted with one coat of dark red oxide primer and two coats of dark red oxide finishing paint. The steel work in the superstructure has one coat of red lead primer and one coat black finishing paint. The underframe (steel) gets one coat of red lead primer and one coat of black finishing paint.

MATERIALS USED FOR DIFFERENT COATS

The composition of these paints is as follows:

Red Lead Primer.—Two volumes of reinforced red lead semi-paste paint and one volume of standard thinning mixture. The red lead semi-paste is covered by specification R810 and calls for: "Pigment 82 per cent and liquid 18 per cent, the pigment portion to consist of red lead, not less than 65 per cent, and the remainder to be silicious matter, such as aluminum silicate, magnesium silicate, silica, or a mixture thereof. The red lead shall contain not less than 85 per cent true red lead (Pb_3O_4), the remainder to be litharge (PbO). The liquid portion shall consist of raw linseed oil."

Red Oxide Finishing Coat.—One volume dark red oxide semi-paste paint, 1½ volumes standard thinning mixture. The dark red oxide semi-paste is covered by specification 812-A, which requires that grinding proportions shall be: Pigment 70 per cent and liquid 30 per cent. The pigment portion shall consist of ferric oxide, not less than 30 per cent, and the remainder shall be silica or silicious earth pigments. The liquid portion shall consist of raw linseed oil.

The black finishing paint used on the underbody steel work consists of 1 volume black semi-paste paint and 1½ volumes standard thinning mixture.

The black semi-paste paint is covered by specification R811, which requires that the grinding proportions shall be pigment 50 per cent and liquid 50 per cent. The pigment portion shall consist of lamp black, not less than 20 per cent; red lead, not less than 5 per cent, and the remainder shall be shale black, aluminum silicate, magnesium silicate, or a mixture thereof.

The lamp black shall be of such quality as to produce the standard color and shall not contain more than 2 per cent of ash. The liquid portion shall consist of raw linseed oil. The thinning mixture used throughout in all these paints is covered by specification 822A, which requires that "the mixture shall consist of the following materials by weight: Fixed oils, minimum, 40 per cent; drier, maximum, 10 per cent, and mineral spirit, maximum, 50 per cent." The term "fixed oils" is used in the specification in contradistinction to the volatile products.

The specification goes on to say that "the fixed oil portion shall contain at least 50 per cent of linseed oil, the remainder being drying or semi-drying oils." A better wording would have been, the remainder being "other" drying or semi-drying oils, inasmuch as linseed oil itself is the "drying" oil par excellence. The specification then proceeds, "the drier may be of the oleate, linoleate or resinate type. If resinate is used, the rosin shall be practically all neutralized."

With the painting of passenger cars we become more concerned with the decorative than with the protective side of the subject. In general a higher quality of paint is required, containing a more finely ground pigment, and of course a much greater degree of attention is paid to the preparation of the surface of both wooden and steel cars. In fact, it may be said that too much attention has been paid in the past to obtaining an exceedingly smooth surface and a high polish. The painting of passenger cars in the past has been based on the methods which grew up in the painting of the expensive and highly polished horse-drawn private carriages just as the railway coach itself was an outgrowth from the stage coach, which it closely resembled in its early years. Thus a typical schedule for the painting of exterior of steel passenger cars was as follows:

SCHEDULE FOR PAINTING STEEL CARS

"Steel parts are to be sand-blasted and primed with a metallic primer, giving sufficient time to dry thoroughly, which will take approximately two days. On the third day a coat of surfacer is applied, and when dry the rough places are filled in with putty and a surfacer compound. After this has dried, three coats of surfaces are applied. The surface is then rubbed down smooth with pumice stone and water and is then ready for the application of the body color, of which it is customary to apply two coats. The lettering and striping is then applied and the surface given three coats of varnish."

This is obviously a very elaborate and costly process, extending over some eighteen days, and in reality is one which will not bear analysis. To produce on a commercial vehicle traveling through the dust and grime of our cities a highly polished surface of a character which we would not think of attempting to produce on the most expensive private house, which as a general thing lasts as a structure many more years than the average car, seems ridiculous. Shorter and quicker methods are therefore coming into vogue, a typical schedule being:

First coat, metallic primer; second coat, body color; third coat, surfacer compound and putty; fourth coat, body color; fifth coat, varnish, and sixth coat, varnish. Others are substituting enamel paint for the body color and varnish, with a good deal of success and a reduction in cost.

CARS PAINTED WITH ENAMEL

A recent recommendation of the committee on maintenance and care of paint and varnish of the paint division of the A. R. A. is "that when cars are painted with enamel without varnish the car should be primed and surfaced in the usual way and be given two coats of oil varnish enamel, which dries very slowly." Clear varnish enamel does not give the same surface as oil varnish enamel. The "surfaces" referred to in the foregoing are of the same nature as the "rough stuff" of the old carriage painters, this being described by Sabine in his work "The Technology of Paints and Varnishes," as follows:

"Rough Stuff.—A silicious filler, ground to a moderate degree of fineness mixed with some white lead. The liquid is essentially a rubbing varnish. The thing aimed at is to make a sort of paint which will dry rapidly to a very hard surface, capable of being ground down to a smooth, glassy finish, and at the same time have about the same rate of expansion and contraction as the foundation on which it rests, so that it will not crack and come off."

The body color pigment is usually ground in Japan and thinned with turpentine, the Japan being a "liquid made by cooking gum shellac with linseed oil in a varnish kettle, litharge being usually added to give drying properties." The pigments used are as a general thing those already listed in this article, the desired color or shade being obtained by the addition of organic coloring matter. Thus the familiar "Tuscan Red" is composed of 75 per cent or more sesquioxide of iron with some carbonate of lime and about 15 per cent organic coloring matter.

With regard to the protective properties of the various coats applied to passenger cars, interesting comment is made in a recent paper presented by C. H. Hammond before the paint division already mentioned, as follows:

"The steel primer is a thin varnish-like substance and is not recommended as a protection to steel when used alone. It must itself be protected by other paints. Surfacer is simply another form of putty and the only reason it is used is to obtain a level surface. The two color coats are made up of body color ground in Japan and thinned to a working consistency by the mixing in of turpentine or turpentine substitute. In these three classes of materials, the priming coat, the surface coats and the color coats will not protect steel from rusting. The real protection from rust is the varnish, two or three coats to be applied on top of all the previous unstable coats."

OLD METHOD OF PAINTING UNSATISFACTORY

Mr. Hammond goes on to state that the old method of painting does not in his judgment give satisfactory results, and that in reality one coat of body color and three coats of varnish are all that a steel passenger car body really needs, "that the body color should be furnished in paste form, ground in equal parts of raw linseed oil and gold size Japan and reduced with raw linseed oil to a consistency that will cover with one coat. The lettering may be done one day following the preceding and on the following day the first coat of varnish can be applied, followed by two more forty-eight hours apart." Some opposition was expressed to these views at the meeting, and we quote them simply to show the tendency away from the old elaborate "coach painting" method.

Other practices are being adopted to lessen the time required to paint a car and to give a durable finish, much attention being given among other things to providing means for artificially drying the paint between coats, thus shortening the time and also baking the paint. Proper facilities have to be provided for heating the air to about 180 deg. and to providing the proper moisture content in the air. It is being done successfully and holds out much promise. Trade preparations are also being used which replace the primer and surfacer coats, thus saving time.

In conclusion it may be said that the whole subject of painting is in a state of flux, the tendency being to break away from elaboration of decoration and finish. This is a proper tendency, but care must be exercised not to forget the fundamentals that cannot be lightly swept away and which depend for their fulfillment largely upon the honesty in the manufacture and care in application.

Cutting Energy Costs in Seattle

Power Department Reduces Car-Mile Energy Consumption on Municipal Railway, Principally by Inducing Economical Operation of the Cars

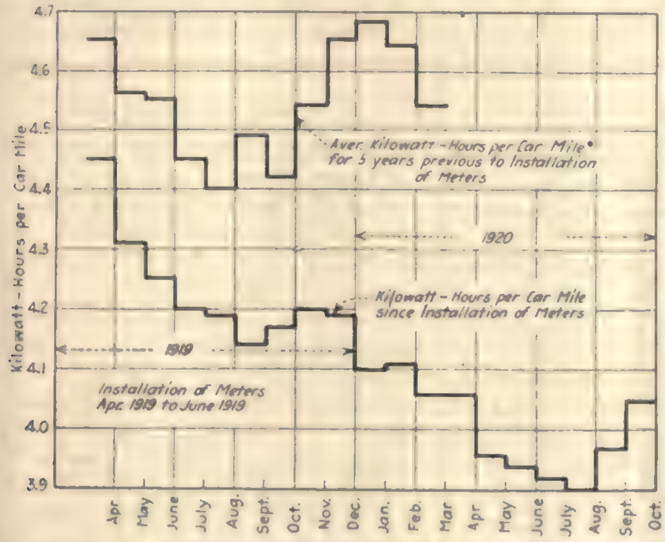
BY S. E. GOODWIN
Supervisor of Power Seattle (Wash.) Municipal Street Railway

WHEN the city took over the electric railway lines in Seattle, the power department set for itself the task of saving energy in all possible directions. Energy is purchased by the city on a long-time contract at a rate of 1 cent per kilowatt-hour, delivered to the railway feeders, so that the department is concerned in savings from substation to wheel tread.

Before the purchase of all of the lines in this city, a power-saving campaign had been initiated on the two lines operated by the Seattle Municipal Railway. This campaign, which began early in 1919, was so successful in its results as to lead to its adoption for the enlarged Municipal Railway system.

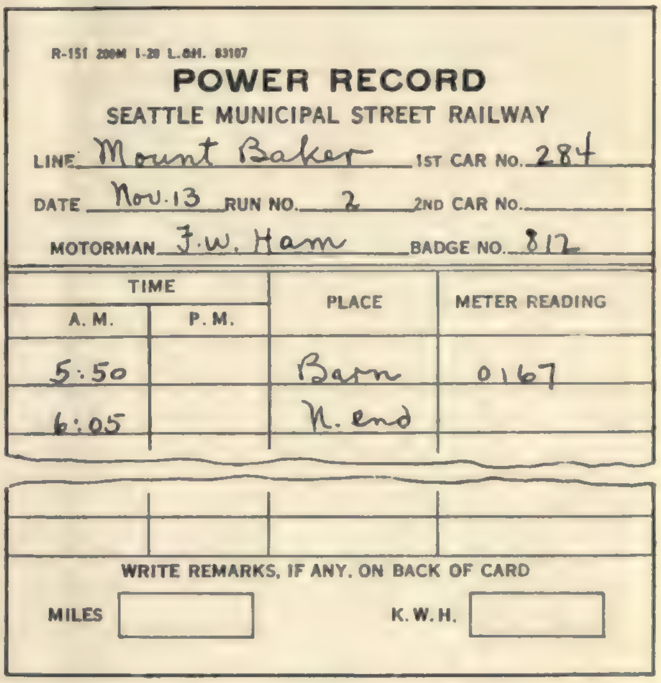
In order to determine just how much energy was used on the cars, as well as to provide an incentive for careful operation, the kilowatt-hour meter was adopted for use on the cars as best adapted to the desired end. The selection was made after a careful study of other devices used on cars to stimulate careful operation.

A few cars were equipped for trial with the meters in February, 1919, and the result was so encouraging that about forty-five more equipments were ordered for the remaining cars. Before all of these had been installed the city purchased the railway property from the Puget Sound Traction, Light & Power Company, commencing to operate it on April 1. Additional meters were then ordered for 100 cars operating out of the Fremont carhouse, and in August an order was placed for about 300 additional meters for the remaining cars.



ENERGY CONSUMPTION PER CAR-MILE ON SEATTLE MUNICIPAL STREET RAILWAY, COMPARED WITH PREVIOUS FIVE-YEAR AVERAGE
(Energy measured at car)

During the power-saving campaign the power department made a number of stop-watch tests on several lines over level stretches of from 600 to 1,000 ft. and found as follows: A motorman starting from standstill can, after attaining just enough speed, coast between 50 and 60 per cent of the distance between the stops in the same time that it would have taken him to cover the distance without coasting, but keeping his power on to such a point as to necessitate immediate application of the brakes to bring the car to rest at the same points. This is due, of course, to the fact that by the non-coasting method the motorman builds up a certain speed which has to be overcome by braking, whereas the coasting motorman rolls along at a more uniform speed and consumes no greater total time between stops. This fact is mentioned here, although quite familiar, because with us it was one of the strongest talking points that we have in proving to the men that coasting a good proportion of their mileage does not necessarily cause them to fall behind their schedules.



R-151 200M 1-20 L.&H. 83107

POWER RECORD

SEATTLE MUNICIPAL STREET RAILWAY

LINE Mount Baker 1ST CAR NO. 284

DATE Nov. 13 RUN NO. 2 2ND CAR NO. ____

MOTORMAN F. W. Ham BADGE NO. 812

TIME		PLACE	METER READING
A. M.	P. M.		
5:50		Barn	0167
6:05		N. end	

WRITE REMARKS, IF ANY, ON BACK OF CARD

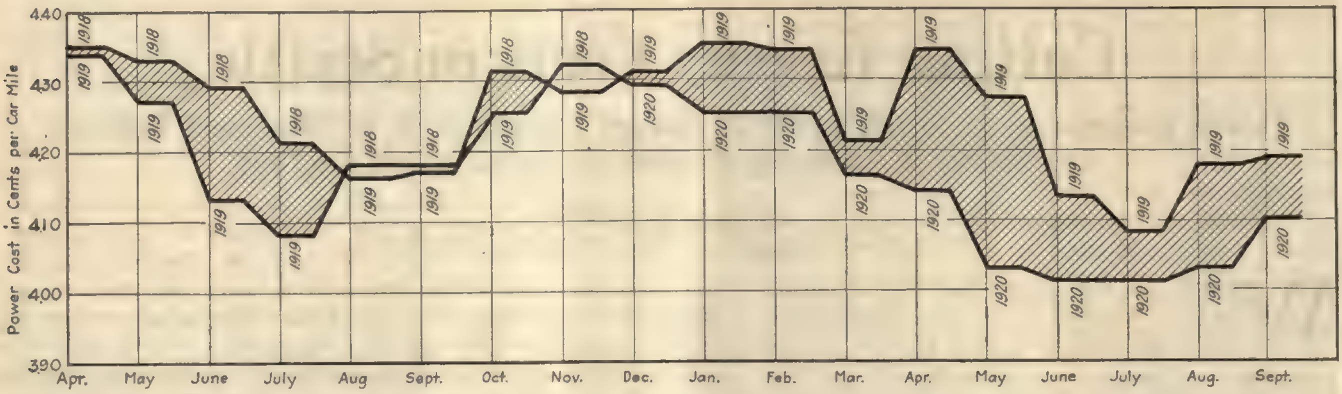
MILES ☐ K. W. H. ☐

SAMPLE POWER RECORD FORM—ORIGINAL 3 IN. X 7 IN.

In inaugurating the power-saving campaign, two instructors of power saving were sent out to ride with motormen and to show them how, by proper feeding of the controller, by the use of more coasting, and by improved braking, they could lower their power records from 5 to 15 per cent. Informal talks were given to small groups in carhouses by instructors, and bulletins on power saving were issued periodically in an effort to interest the motormen in the advantages of power saving.

FOLLOWING UP THE RECORDS

During the first ten months of the power-saving campaign $5 monthly prizes were awarded to the regular and relief men on each line having the lowest energy consumption per car-mile. This scheme was later abandoned, one of the principal reasons being the difference



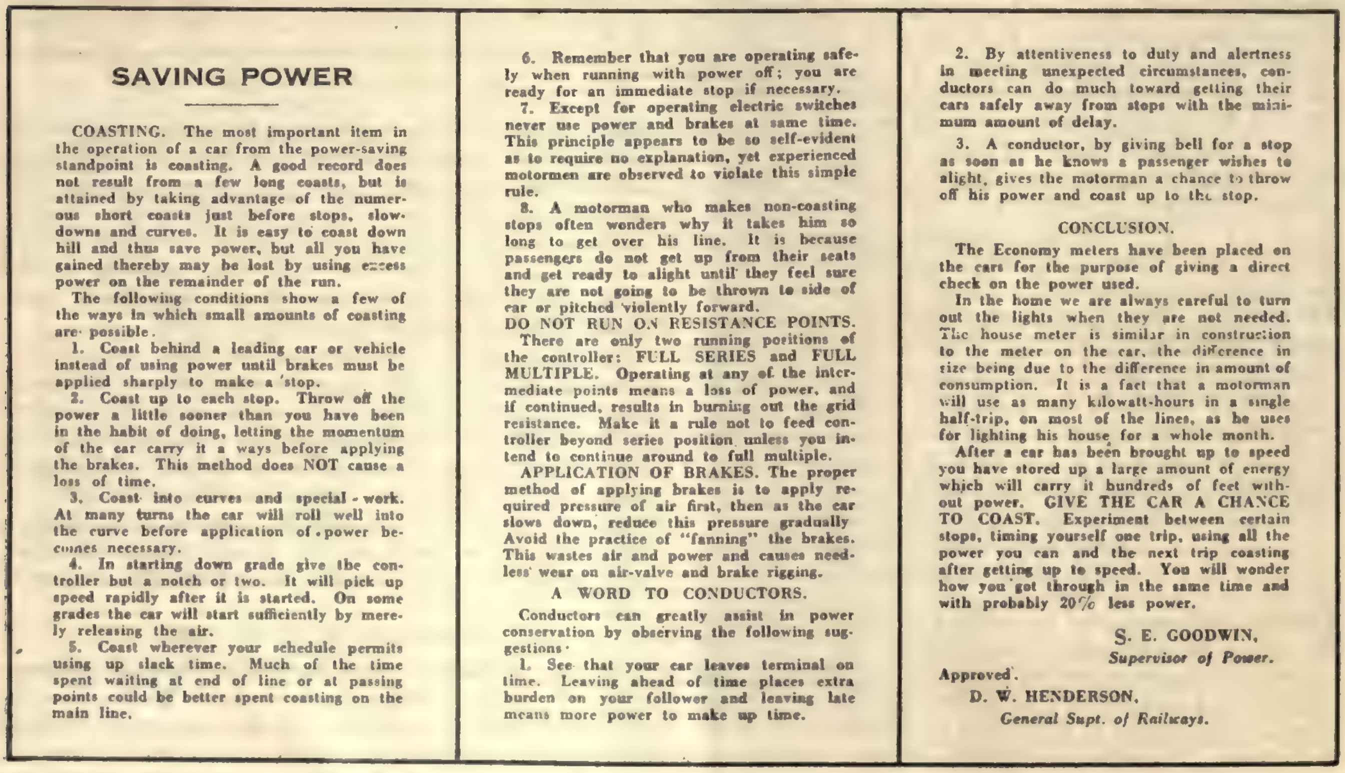
GRAPHICAL RECORD OF COST OF ENERGY IN CENTS PER CAR-MILE, SEATTLE MUNICIPAL STREET RAILWAY, SHOWING EFFECT OF POWER-SAVING CAMPAIGN

in numbers of passengers carried on certain runs and the consequent use of more power to make the extra stops. Difference in types of cars on the same line was also a cause of more or less complaint among the motormen.

Individual records are computed from meter cards. A list of comparative records, without the names, is then typed for each line and a copy sent to each motorman, a check mark being placed opposite his own record; each man thus learns his relative standing, but does not know who made the other standings. With the limited clerical force available for this work, we cannot compute each man's record for each entire month, so we take three lines per week and figure the records for these trainmen for a week or ten days. Each man thus gets a report of his work only about once in two months. It is interesting to note, however, what a good saving has been obtained despite this very limited follow-up. Also, since last May, almost no instruction has been given the motormen, nor is it planned to give more than can be done by the chief motorman incidental to his various other duties. The saving shown, therefore, is due almost entirely to the mere presence of the meters on the cars.

The following data regarding the several types of cars in use in Seattle may be of interest. We have 233 single-end, double-truck cars, weighing from 44,400 to 55,000 lb., and having gear ratios of 15: 71, 17: 69 and 17: 67. The motors are of several types, General Electric No. 80 predominating. There are 154 double-end, double-truck cars varying in weight from 38,000 to 49,000 lb. Thirty-one of these have been converted into one-man cars of the large type. The gear ratio is mostly 17: 67 and the motors General Electric No. 58, No. 67 and No. 80.

Nine rebuilt one-man cars of the small type weigh about 22,000 lb. each and have two GE No. 58 motors with a gear ratio of 16: 67. The safety cars were first put into operation in February, 1918. There are now fifty-four of these, weighing 13,000 lb., with gear ratio of 13: 74 and equipped with Westinghouse No. 506 AN2 motors. In order to make the power consumption comparison with previous years fair, in view of the installation of the more economical safety cars, we have figured



SAVING POWER

COASTING. The most important item in the operation of a car from the power-saving standpoint is coasting. A good record does not result from a few long coasts, but is attained by taking advantage of the numerous short coasts just before stops, slowdowns and curves. It is easy to coast down hill and thus save power, but all you have gained thereby may be lost by using excess power on the remainder of the run.

The following conditions show a few of the ways in which small amounts of coasting are possible.

1. Coast behind a leading car or vehicle instead of using power until brakes must be applied sharply to make a stop.

2. Coast up to each stop. Throw off the power a little sooner than you have been in the habit of doing, letting the momentum of the car carry it a ways before applying the brakes. This method does NOT cause a loss of time.

3. Coast into curves and special-work. At many turns the car will roll well into the curve before application of power becomes necessary.

4. In starting down grade give the controller but a notch or two. It will pick up speed rapidly after it is started. On some grades the car will start sufficiently by merely releasing the air.

5. Coast wherever your schedule permits using up slack time. Much of the time spent waiting at end of line or at passing points could be better spent coasting on the main line.

6. Remember that you are operating safely when running with power off; you are ready for an immediate stop if necessary.

7. Except for operating electric switches never use power and brakes at same time. This principle appears to be so self-evident as to require no explanation, yet experienced motormen are observed to violate this simple rule.

8. A motorman who makes non-coasting stops often wonders why it takes him so long to get over his line. It is because passengers do not get up from their seats and get ready to alight until they feel sure they are not going to be thrown to side of car or pitched violently forward.

DO NOT RUN ON RESISTANCE POINTS.

There are only two running positions of the controller: FULL SERIES and FULL MULTIPLE. Operating at any of the intermediate points means a loss of power, and if continued, results in burning out the grid resistance. Make it a rule not to feed controller beyond series position unless you intend to continue around to full multiple.

APPLICATION OF BRAKES. The proper method of applying brakes is to apply required pressure of air first, then as the car slows down, reduce this pressure gradually Avoid the practice of "fanning" the brakes. This wastes air and power and causes needless wear on air-valve and brake rigging.

A WORD TO CONDUCTORS.

Conductors can greatly assist in power conservation by observing the following suggestions·

1. See that your car leaves terminal on time. Leaving ahead of time places extra burden on your follower and leaving late means more power to make up time.

2. By attentiveness to duty and alertness in meeting unexpected circumstances, conductors can do much toward getting their cars safely away from stops with the minimum amount of delay.

3. A conductor, by giving bell for a stop as soon as he knows a passenger wishes to alight, gives the motorman a chance to throw off his power and coast up to the stop.

CONCLUSION.

The Economy meters have been placed on the cars for the purpose of giving a direct check on the power used.

In the home we are always careful to turn out the lights when they are not needed. The house meter is similar in construction to the meter on the car, the difference in size being due to the difference in amount of consumption. It is a fact that a motorman will use as many kilowatt-hours in a single half-trip, on most of the lines, as he uses for lighting his house for a whole month.

After a car has been brought up to speed you have stored up a large amount of energy which will carry it hundreds of feet without power. GIVE THE CAR A CHANCE TO COAST. Experiment between certain stops, timing yourself one trip, using all the power you can and the next trip coasting after getting up to speed. You will wonder how you got through in the same time and with probably 20% less power.

S. E. GOODWIN,
Supervisor of Power.

Approved.
D. W. HENDERSON,
General Supt. of Railways.

THREE PAGES OF INSTRUCTION FOLDER SHOWING HOW POWER CAN BE SAVED all the safety-car mileage at 60 per cent of the equivalent two-man car mileage, on the basis that the safety cars use 60 per cent as much power as the larger cars. This makes allowance for the small cars, so that the saving in power as shown in the accompanying curves is due entirely to better operation.

BOND TESTING

Power lost in the bonding of the rails is, of course, largely a preventable loss. A survey made immediately after the acquisition of the lines by the city showed 1,222 bonds in need of repair. Bond testers were followed by a paving repair and welding crew from the road department, and this crew replaced defective bonds with new ones of the AW-3 type, Ohio Brass gas weld. A second survey of the entire trackage was completed early last summer, and 1,263 bonds were found to be in need of repair. Of this number, 211 had not been reached by the repair crew since the discovery of the defects on the first test, owing to the need for the services of the welders on numerous construction jobs. The total number of bonds on the system is 48,600; of this number there are now not more than 350 defective.

METER INSPECTION

The Economy meters installed on the cars have now been placed on a regular inspection basis. The meter element is taken out after a run of about nine months and thoroughly cleaned, oiled and tested. An old one-man car has been fitted up with a testing rack and work bench, and this is run to one of the carhouse yard tracks and the meter elements are changed on the cars standing in the yard. Two men are thus able to overhaul from twelve to eighteen meters per day. Upon completion of the work at one carhouse, the test car is moved from yard to yard until all meters have been overhauled.

The kilowatt-hour meters at the substations of the Puget Sound Power & Light Company, which measure 95 per cent of the total railway power, are tested once each month by two of that company's electricians, assisted by a representative of the Municipal Railway. Adjustments are made in the monthly power bills for any discrepancies over 2 per cent in the accuracy of these meters. As the monthly consumption is close to 5,000,000 kw.-hr. it is quite essential that these meters be maintained at a high degree of accuracy.

To return to the power situation on the property in general, the economies which have been effected by the use of meters and otherwise, as mentioned, are reflected in the charts which accompany this article. These charts are self-explanatory; the record speaks for itself. Averaged over the eighteen-month period from April, 1919, to September, 1920, as compared with a similar period one year earlier, there was a net monthly saving due to the use of the meters of about $1,000. In making the calculation we have assumed in the cost of power the following elements: Total cost of energy purchased for railway operation, interest at 5 per cent on the investment in meters and their installation, etc., depreciation of the meters at 5 per cent per annum, superintendence, records, follow-ups, and monthly prizes to March, 1920, when the awarding of the prizes was discontinued.

The watt-hour meters used on the cars are of the "Economy" type, sold by the Economy Electric Devices Company. L. E. Gould, president of this company, and his associates have co-operated with us in making our campaign successful.

Electrical Testing in Omaha

Methods and Equipment Used for Testing Circuit Breakers, Field Coils, Armatures, Etc., Are Described and Pictured

IN THE accompanying five pictures are shown some of the equipment which is used and the practice followed in testing and repairing motors and other electrical equipment in the shops of the Omaha & Council Bluffs Street Railway, Omaha, Neb. At the left of the barrel in Fig. 2 is shown a transformer arranged for testing field coils. The primary of this transformer is connected to the source of energy supply through the small lever-type switch at the left of the switchboard panel seen at the right of the picture. Each of the button contacts of this switch is connected to taps on the primary of the transformer. The condition of the field coil is then tested by reading the voltmeter and ammeter on the switchboard just above the small switch referred to. While the coil is being tested, it is subjected to mechanical pressure by means of two wooden levers 5 ft. long, one of which is shown at the left of the barrel. The voltmeter used in this connection is cut in or out of the circuit by means of the plug which appears on the switchboard just below the meter.

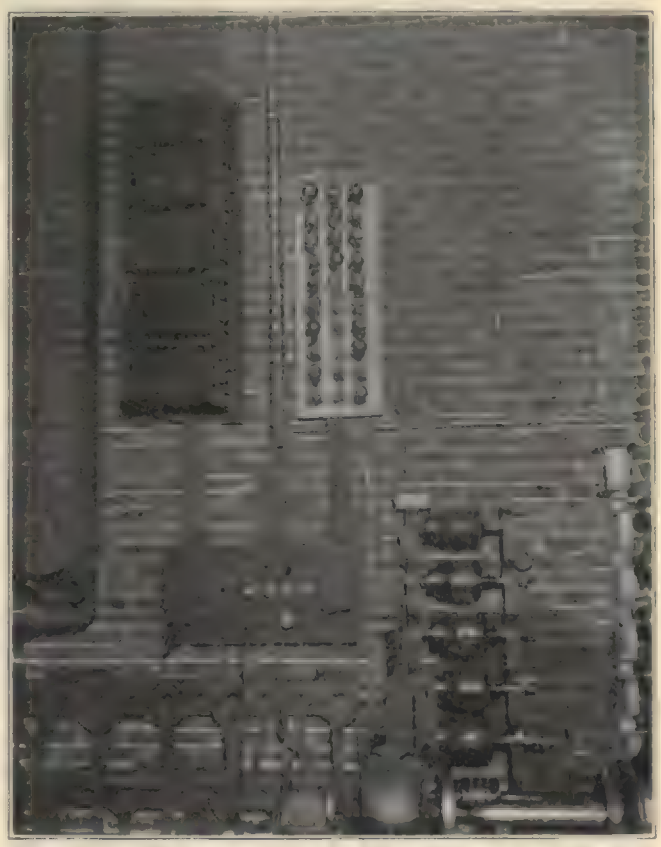


FIG. 1—LAMP BANK AND GRID RESISTORS FOR CONTROLLING TESTING CURRENT

The water rheostat made from a barrel connected with running water and equipped with the necessary adjustable plate, which is seen at the center of Fig. 2, is used in testing circuit breakers. These are mounted on a board between the switchboard and barrel, where pins are so located that any standard breaker can be mounted without the use of tools. Three pairs of leads coming out from the bottom of this board with polarity marked are provided for different types of breakers. The heavy current used in making the test is broken by means of

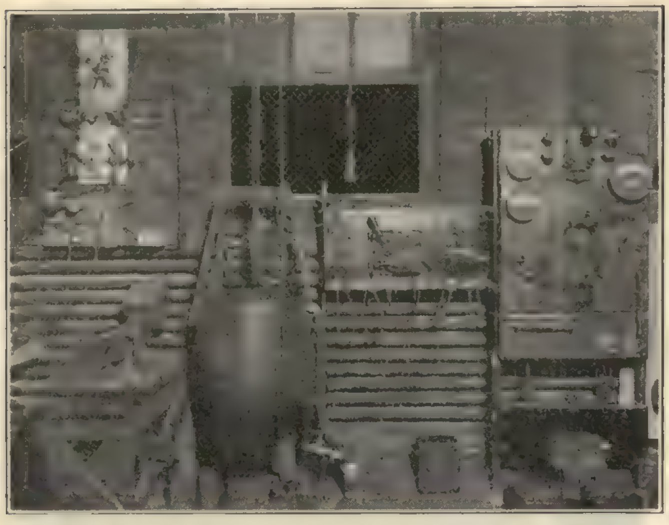


FIG. 2—VARIOUS ELECTRICAL EQUIPMENT USED IN TESTING ARMATURES, FIELD COILS AND CIRCUIT BREAKERS IN THE OMAHA SHOPS

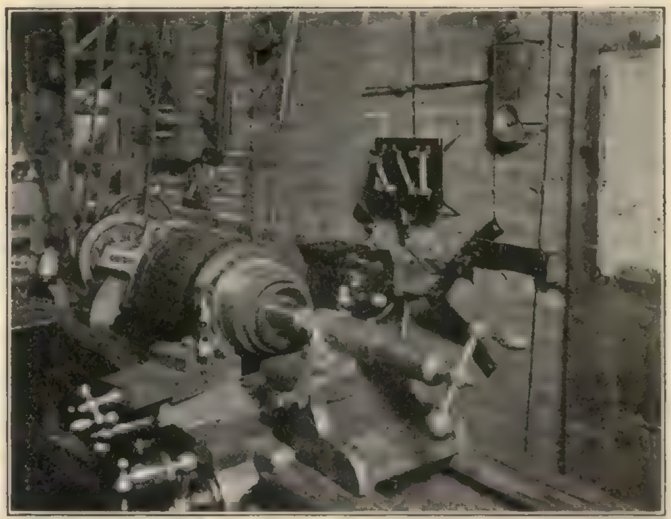


FIG. 3—ADJUSTABLE TRANSFORMER USED FOR TESTING ARMATURES WHILE MOUNTED IN LATHE

the four old circuit breakers mounted on the floor just in front of the switchboard and usually manipulated by foot. Calibration is accomplished by means of the direct-current ammeter which is mounted at the upper right-hand side of the switchboard.

This switchboard also carries other switches for use in connection with a small transformer mounted back of the switchboard and employed for break-down tests of armatures. Old armatures are subjected to 800 volts pressure, while new ones are tested up to 1,600 volts. In making these tests a bank of 220-volt lamps is used in series with the armatures.

Fig. 3 shows a convenient mounting of an armature testing transformer. This is supported behind the lathe used in turning and slotting commutators as well as banding the armatures. When this mechanical work is finished the electrical test for shorts can be very readily and quickly made. The testing transformer is mounted in a special bracket on the wall and it can be adjusted along the wall to line up with the center of any size armature core and toward or away from the wall to come within ⅛ in. of the armature. When adjusted to the right position it is held rigidly by means of a small rod placed through holes in the bracket. When finished all armatures are given a final test with this transformer before being taken out of the lathe.

In Fig. 1 is shown the scheme of control for obtaining the proper current for testing different size armatures. Current for testing main motor armatures is taken through the grid resistance which is seen mounted on the wall. This cuts the current used down to about 30 amp. A circuit breaker is connected in the circuit for protection against a ground. For testing air compressor armatures the current is drawn through the bank of lamps, also mounted on the wall. The amount of current in this case is controlled by the four button-type switches through a range from 1 to 6 amp.

The current thus controlled, as shown in Fig. 1, is applied to any motor under test by means of the small testing crab seen in Fig. 4, which may be clamped on any winding stand and used on any size armature. In making these tests a switchboard-type ammeter, shown to the left in Fig. 4, has been converted to use as a millivoltmeter by connecting in series with it a small compensating coil taken from a wattmeter. This can be adjusted to give a good, clear reading on the meter regardless of the size of wire on the armature.

Fig. 5 shows the unique practice followed in the Omaha shops of gas-welding broken armature leads instead of soldering them. In doing this work the other leads adjacent to the one to be soldered are protected from the hot flame of the acetylene torch by means of a sheet of asbestos, the operator making his weld through a small hole in the sheet.

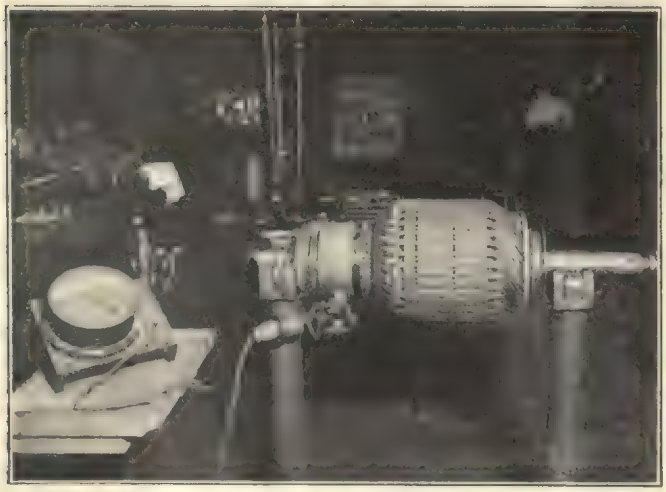


FIG. 4—TESTING CURRENT THROUGH COMMUTATOR

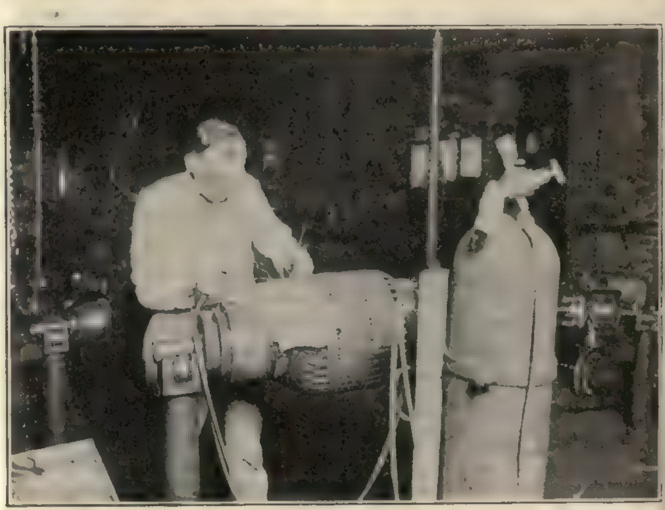


FIG. 5—GAS-WELDING BROKEN ARMATURE LEADS

Maintaining Track Under Public Trustees[*]

Track Rehabilitating Work, Regrading and Welding Which Were Carried Out by the Eastern Massachusetts Street Railway During the Years 1919 and 1920

By FRANK B. WALKER
Engineer Maintenance of Way Eastern Massachusetts Street Railway

DOUBLE TRACK LINE RAISED FROM 8 IN. TO 14 IN. TO PROVIDE BETTER DRAINAGE

WHEN the Massachusetts property of the old Bay State Street Railway was acquired by the Eastern Massachusetts Street Railway one of the first problems was to put the tracks in good, safe operating condition and to reduce future maintenance costs. Four points were given especial consideration—joints, ties, ballast and drainage. Among the various items of equipment purchased were two Thermit-welding outfits, twelve Lincoln arc-welding type W machines, six Seymour grinders, making a total of thirteen; fourteen Universal grinders, seven Indianapolis welders, making a total of fourteen; five Erico welders or bonders, one Lincoln bonder, or a total of five; five Ford roadsters, eight Ford trucks, eight Stewart 2-ton trucks and two Stewart 1-ton trucks.

Since June 1, 1919, we have relaid 210,000 ft., or 39.7 miles, of track, overhauled 874,000 ft., or 166 miles; put in 193,000 ties, Lorain-welded 9,300 joints, Lincoln-welded 6,500 joints, Thermit-welded 1,600 joints, or a total of 17,400 welded; put in 520 pieces of special work, put in 1,200 pair new angle bars, taken the vertical bends out of 10,000 joints, surface-welded 9,900 joints and bonded 27,000 joints.

On paved streets we have done very little reconstruction except when it was done concurrently with the city's paving work. If and when a city or town removed the paving from the track zone and our track needed repairs or renewal we did our trackwork and the city did the paving. In case of change in grade or location the city was called upon to pay for not only removing and repaving but for all expense incident to changing grades and line, including ballast lost, etc.

In several cases where tracks were changed from center to side location the city or towns made the new excavation, supplied all the new ballast and uncovered the old track. We removed the old track, laid the new one and the city or towns then repaved the new as well as the old track zones. On country lines we raised our tracks up to or above the level of the highway and on many miles left the track entirely open or half open, depending on local conditions; the purpose in using open or half open section being to secure better drainage and to reduce snow trouble and cost of future maintenance. The trouble with these lines was that they were too low to start with and as the highways were rebuilt from time to time our tracks were left down in the mud. Where state highways are being rebuilt and the grade of the shoulder materially changed the commission is paying for the cost of raising our track to the new grade.

18,000 JOINTS WELDED

It was also realized that one of our greatest causes of bad track was bad joints, so it was decided to have all joints on the system finally welded. We probably had 240,000 joints on the system and welded 3,000 in 1919 and 15,000 in 1920. We still have a long way to go. We have great hopes of the arc-welding process, but, like all such processes, the work must be carefully watched. During the past year we employed several welding experts to start us right, but found that we have to work out our own salvation with our own men really to get anywhere. In making the 1920 budget we planned to Thermit weld all new 9-in. and 7-in. girder rail, to Lorain weld all old good quality 9-in. and 60-lb., 70-lb. and 75-lb. T-rail, where lines needed rehabilitation in long, continuous stretches and where the joints were very bad, and to arc weld 9-in. and 60-lb., 70-lb. and 75-lb. T-rail where the lines were overhauled and where joints were not beyond the repairing stage, also to arc weld new and relayed 60-lb. and 75-lb. T-rail. The Thermit process is the most expensive and probably the most satisfactory joint. The Lorain joint has worked well on the softer or rather older types of rail, but high percentages of breaks come on the higher carbon rails of all classes, whether new or several years old. Out of 28 Lorain joints of 9-in. rail rolled in 1913, twelve broke the first day. We had to Thermit weld them as we had the street all torn up. The track work in connection with the Lorain welding is quite expensive.

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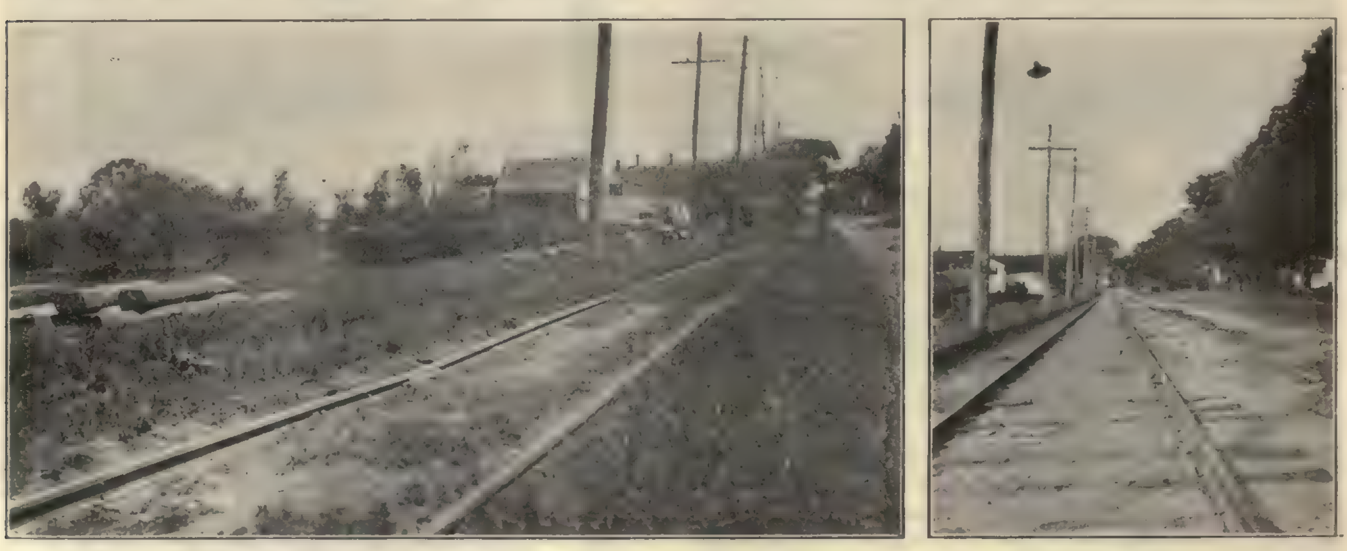
[*] Abstract of paper read before the New England Street Railway Club, Dec. 2, 1920

Broken stone is, as we all know, an ideal ballast, but why take out good, firm compacted sand or gravel which has supported a track in paved streets for twenty years or more without trouble and put in broken stone at $4 per cu.yd.? It is absurd and an economic waste. Ballast serves two purposes only—first, to hold the track against movement; second, to assist drainage. I much prefer poor ballast to poor surface drainage. On steam railroad prairie lines in the Dakotas, where no gravel or even sand was available within several hundred miles, we held track on black gumbo mud by pitching the slope from top of tie at center to bottom of tie at ends and then lip slicking down the surface when wet, to form a water shed. Our policy on our country lines here has been to get the track up on ballast if available, but get drainage. Frequently we found our ballast on top of the track instead of under it. We are now putting our ballast under the ties.

We were rarely bothered with poor ballast under our old paved track, but if necessary in relaying we have used 6 in. of good gravel or broken stone. On country lines hundreds of miles were in bad shape, tracks were too low and were almost all backfilled with mud or gravel. We have attempted to raise up such lines where considerable work was done and to leave the track either open or half open. We also suffered in the past from poor drainage, and of all the serious defects in trackwork, we class poor drainage as the worst. We have tried to remedy this by raising up the track and by opening the section similar to steam roads, to dig ditches, to place catch basins and to lay pipes.


BROCKTON-EASTON LINE, WITH 60-LB. T-RAIL BEFORE AND AFTER REHABILITATION

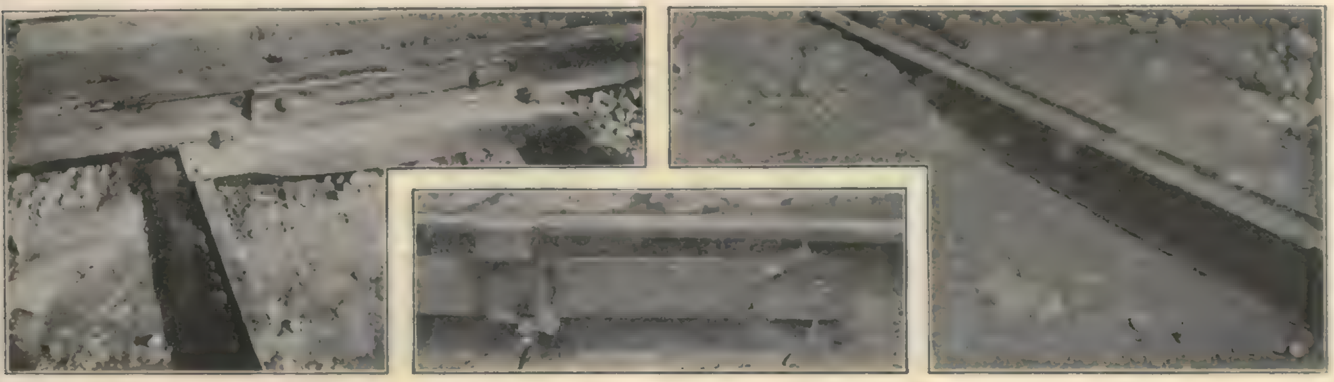
Careful attention was given to the repairs of joints. Trackmen tend to make repairs in a careless or half-hearted way. Mere tightening of bolts will not do the trick on either light T or heavy girder rails. We now insist on having the ties retamped or replaced if necessary, new plates and new bolts put in if the old ones are worn, and in case of cupped joints, these are filled with surface welders and then ground properly. We found many of our welders were surface welding cupped joints without seeing that joints were first properly repaired. We started a campaign to get better grinding. One trouble was found in that grinders, as well as surface welders, did not have true straight edges, and I always carried one in my car to test joints whenever I stopped. Considerable study has been given to instruct our grinders on all classes of work.

On our joint work we have been quite successful in using vertical rail benders. These were built by our trackmen, usually out of old rail, and if the joints were raised higher than the track surface and then tamped up strong they usually held. Frequently it was necessary to rebend some joints. The use of this rail bender ahead of the Lorain welder on badly surface bent 9-in. girder and light T-rails helped materially.

We bought 165,000 chestnut, oak and creosoted pine ties last January and on account of car shortage did not get deliveries, so we purchased 100,000 chestnut ties from the Blue Hill reservation late in the spring, and as these came slowly we had to curtail our work in August on account of the shortage.

Great saving was made by supplying each division with a cutting torch. We even cut bolt holes and ends off new rails until we discovered that we should not use the torch on high carbon rails on account of heat cracks. The torch works fine in cutting out rails for joint repairs and we have hundreds of joints Lorain welded where 12-in. dutchmen were cut in with the torch and the jointing is as good as a saw cut.

Each roadmaster was furnished with a Ford auto-



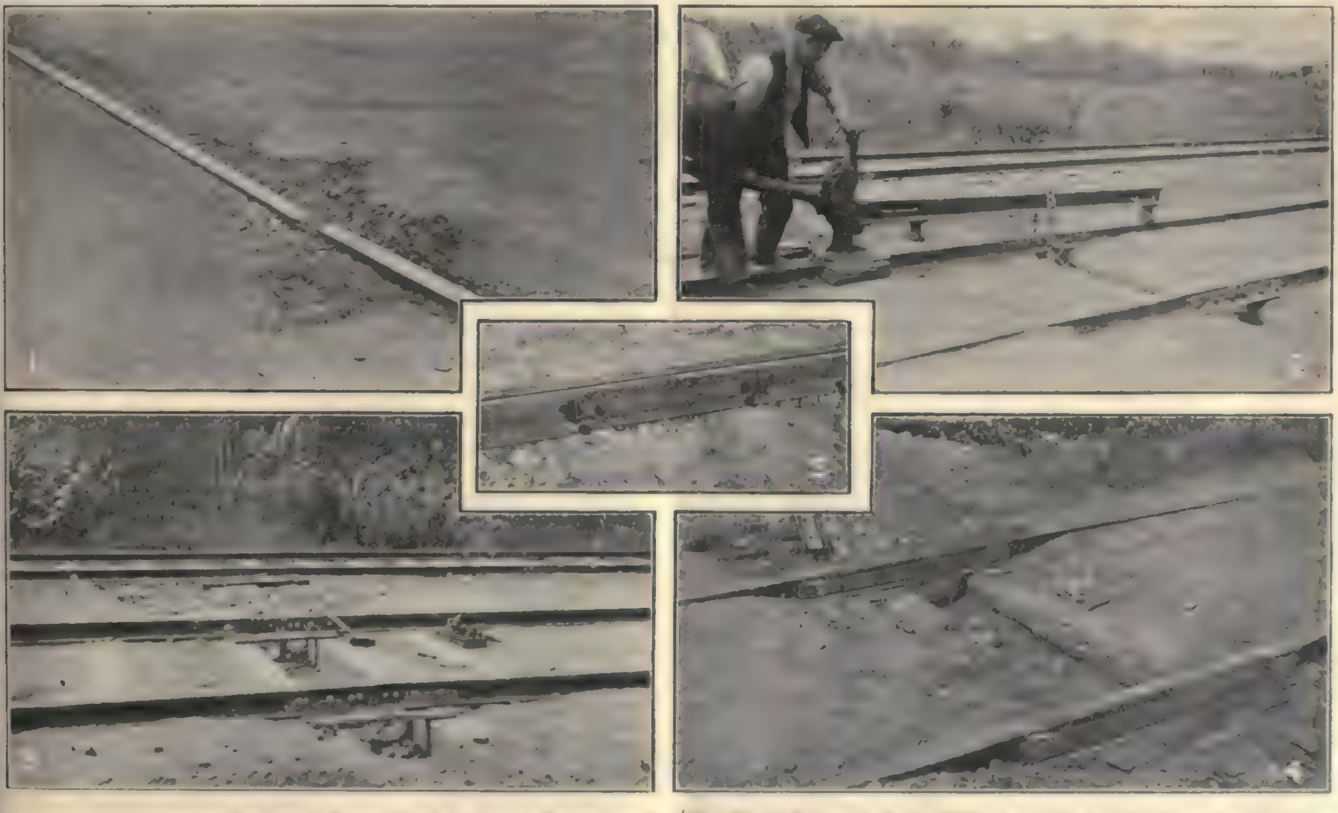
VARIOUS TYPES OF JOINTS REHABILITATED BY WELDING

At left, 7-in., 91-lb. T-rail joint with welded bars and twin steel ties. At right, method of preparing old 9-in. tramhead rail for arc welding. In the center, Lorain welded 9-in. rail with typical failure.

mobile with a light body. These have proved very useful. And on ten divisions we furnished 2-ton Stewart trucks with a large dump body. On the headboard was placed a small hand winch for loading a grinder, welder or bonder onto the truck. The tailboard comes off and the sideboards are designed strong enough for skids, having hooks to hold them on to the truck body. These trucks have proved extremely useful and are going all the time.

Our derrick cars are used chiefly for rails, large loads of ties and special work, the trucks being used for all sorts of hauling, ties, fastenings, ballast cleaning and getting gangs onto and off work.

We have had some interesting bridge work, but I can take time to mention three jobs only: (1) The replacing of footings under some of the steel columns of the Raynham trestle. This is interesting only as it shows that street railway bridges, like many steam railroad bridges built fifteen or more years ago, usually had poorly designed foundations and the footings were not built high enough. (2) The Thermit welding of the 6-in. turning shaft of the North Chelsea drawbridge. We operate 1,100 cars per day over this bridge and did this welding for the city. It took 125 lb. of metal. The shaft was removed and taken to a shop. A 7-in. billet was cut with a torch and bolted onto a heavy erecting plate with the shaft in line and about a 1½-in. gap. Work was started about 3 p.m., and the weld was poured at midnight and by 7 a.m. was ready for machining. (3) The arc welding of the diagonal bar of the Merrimac River Bridge on Bridge Street, Lowell. This bar, 1¼ in. x 2½ in., was bent by a derailed car. After straightening it was, as we expected, too long. We then conceived the idea of cutting out a 5-in. section and arc welding splice bars onto the ends. Before doing so we set up in our shop yard on a 45-deg. angle a sample bar and spliced and welded it. The sample was 1¼ in. x 2½ in., the splices were 1 1/16 in. x 3½ in. each and the length of



VARIOUS STAGES IN THE REHABILITATION OF BADLY BATTERED JOINTS

1. Condition of joint before work. 2. Vertical rail bender used in raising joints. 3. Second stage in Lorain welding. Joints sand blasted and rail raised on shims. 4. Finished Lorain joint. 5. Lincoln arc-welded joint.

SIDE-LOCATED T-RAIL TRACK, TWENTY YEARS OLD, AFTER REPAIRS

LOWELL-BOSTON LINE WITH ARC-WELDED JOINTS AND IMPROVED DRAINAGE

welds 14 in. This sample after welding was tested out in the Technology laboratory and broke at 208,000 lb., with elastic limit of 138,000 lb. The weld held and the bar broke near the end of the weld. As there were 56 lin. in. of weld on each end, it developed 3,700 lb. per inch of weld.

The bridge weld was completed in January, 1920, and holds without signs of failure. This bridge was built of iron in 1884 and a physical test on the piece we cut out was as follows:

Yield point	46,000 lb. per sq.in.
Tensile strength	56,750 lb. per sq.in.
Elongation	19.0 per cent
Reduction area	34.5 per cent

Our loads on this bridge, which was not designed for cars, cause stresses as high as 20,000 lb. per sq.in.

Discussion on Mr. Walker's Paper

In the discussion which followed the presentation of Mr. Walker's paper, H. M. Steward of the Boston Elevated Railway said that in regard to new rails the Lorain joint is not as successful as with older types of rail, but nevertheless it enables one to rehabilitate track cheaper than with any other type of joint. In regard to hard rail good results were obtained with kerosene torches.

George E. Haggas of the Cumberland County Power & Light Company, Portland, Maine, referred to the work that his men have been doing. He said that on a stretch of double track approximately 3,000 ft. long they used a 6-in. 100-lb. T-rail on cedar ties with gravel ballast and split block granite pavement which consisted of old 9-in. pavement cut in two and relaid. The subsoil on this street was clay, which made it extremely important to provide drainage. One drainage method which has worked out with particular satisfaction is to remove all material for a depth of from 6 to 12 in. below the tie and to fill in this space with ledge rock, and then to provide an outlet from this into the sewer.

H. W. Sanborn of the Rhode Island Company said that in Providence there is an ordinance requiring 6 in. of crushed stone ballast under the ties, which under some conditions seems entirely unnecessary. Mr. Sanborn said he had found in bending 60-lb. rail that while trying to bend both rails at once the bend ran back from the joints. The difficulty was overcome by first raising one rail and then the other.

Thomas W. Williams of the Union Street Railway, New Bedford, Mass., said that in regard to putting new plates on old rails they had found that frequently the rail soon becomes worn at the end and becomes just as loose as before repairs were made. They welded a little strip in place and then ground this off and found it worked very satisfactorily.

In answer to a question as to why a space of 2 in. is left out of the seam weld of the Lincoln weld, Mr. Walker stated that in St. Louis they find more seam uncovering and more cracking where the rail is welded straight through, so they carry the welding up to within an inch of the end, thus leaving 2 in. at the joint. The cracking may be due to some temperature stress or to fractures in the head of the rail and they have found less cracking when this method was followed.

F. I. Hardy of the Eastern Massachusetts Street Railway spoke of the service they had obtained from some track with Indianapolis welded joints. These have now been in service for twelve years without a single break. In rehabilitating old track where the rails and joints were bent, they use the surface bender to bring them back into shape, then turn over the plates, bolt them and weld them with the Indianapolis welder.

BROCKTON-EASTON LINE RAISED FROM 6 IN. TO 2 FT. AND REBALLASTED

READING-WAKEFIELD LINE DURING PROGRESS OF WORK

Field Inspection of Railway Track Paving

Some Practical Notes on the Duties of Inspectors and the Essential Requirements of Satisfactory Specifications for the Ordinary Types of Street Pavements

BY HOWARD H. GEORGE
Engineer Maintenance of Way Public Service Railway, Newark, N. J.

AS LONG as the duty to maintain paving rests with railway companies it should be their aim to see that such work is done with the best materials and according to the best practice consistent with the requirements, and this means reliable inspection of labor and material entering into the work. Some companies are prone to overlook the value of such competent supervision of paving work and consider that an occasional visit of the department head to the work or the presence of an ordinary laborer on the job provides a sufficient safeguard of the company's interests. With the idea of emphasizing the importance of adequate supervision of paving it would be well to consider first some of the duties that devolve upon a paving inspector, the object and intent of such inspection being to secure full compliance with the contract and specifications and the performance of first-class work by the contractor in such minor details as may not be specifically mentioned, but are implied by the contract and specifications.

The inspector should report to and be under the direction of the head of the maintenance-of-way department. He should read carefully and make himself thoroughly familiar with the contract and specifications for the particular work to which he is detailed and he should hold the contractor to a strict compliance with the specifications unless he receives instructions to the contrary from the company official to whom he is responsible.

The inspector should make out daily reports on forms provided for the purpose and also keep in a field book a detailed record of each day's work, which should contain the following data: (1) The date of his assignment to the contract and the date of its actual commencement and completion; (2) detailed force account for each working day and the amount of material used; (3) condition of weather each day; (4) delays, reasons for and the period of duration; (5) conditions of sidewalks along the line of paving previous to commencement of work, to forestall any future claims for damages; (6) accidents; date of accident, names of persons concerned and witnesses, cause of accident; (7) any neglect or refusal on the part of the contractor to comply with the contract specifications; (8) damages to persons or property by reason of any act or omission on the part of the contractor; (9) oral instructions or orders received from his superior, and any other matters pertaining to the contract that might be worthy of record; (10) a record of the various types of paving used, such as new specification block, clipped or unclipped block relaid, and their kind, type of joints with which paving is laid, such as sand, cement, tar and gravel, etc., and the exact terminating points of each change.

In order that the work at all stages may be so carried on as to cause the least possible interference with the operation of the cars and with a minimum of inconvenience to the public generally the inspector should see that the street is not unnecessarily obstructed and that the contractor provides temporary passageways at crossings and wherever necessary. He must not permit the contractor to stop the operation of cars during the course of the work and should see that no materials are permitted on or near the track that would interfere with the use of the tracks or endanger the safety of passengers.

The inspector should see that all materials, as they are brought on the work, are piled compactly and neatly at such points as he may designate, and in such a way as shall comply with the regulations of the municipal authorities. All loose material, excavated matter and rejected materials should be removed from the site as soon as possible. He should take special care to see that no material is piled around fire hydrants, and that the space in front of them is kept clear at all times and accessible to the fire apparatus. All necessary signals and warning signs should be placed on the work to protect the public, and city monuments and bench marks must be preserved from injury by the contractor. In case it becomes necessary to move or lower any monument the inspector should notify the City Engineering Department and the contractor should not be permitted to move it unless authorized to do so by the City Engineer.

The inspector should examine all material as it is brought on the work and see that it conforms to the specifications before permitting it to be used. Should the inspector at any time suspect that the material used is not in accordance with the specifications samples should be taken by him, with a record of the location, and his superior notified immediately.

DETAILS OF THE WORK

It should be the duty of the inspector to see that no part of the paving is laid at a higher elevation than the top of the head of the rail, unless specially provided for on the plans. He should see that the space adjoining the web between the head and base of the rail is filled either with paving or a suitable rail plaster, and should not permit the contractor to pave against the rail until this space has been filled.

Where welding of the joints is contemplated and for any reason has not been completed prior to the laying of the pavement, if tar and gravel or cement joints are provided for the latter, the inspector should see that this is omitted for a sufficient space around each joint to permit easy removal of the paving block to accommodate the welding apparatus. The inspector should report to his own engineering department any variation from the ordinary paving that requires special measurements and keep sufficient records to enable him to designate such places when called on for them.

The above points cover in a general way instructions prepared for the guidance of paving inspectors on the Public Service Company's line. In addition to these general instructions, the inspector should watch out for the following points, but this is not to be construed by the inspector to mean that they are the only items to be checked, because he is to keep a close supervision over the entire job:

SUSPENSION OF CONCRETE WORK

Cement must be effectually protected from water or dampness. Packages of cement which when turned out contain hard lumps should be rejected. Where the contractor is to place the concrete foundation for the paving the inspector shall see that the specified proportions are strictly adhered to. Where the sand and stone are supplied to the mixing board by wheelbarrows and the cement in bags the inspector shall measure same to see that the contractor is using the right proportions of cement, sand and stone. One standard bag of cement will be considered as 1 cu.ft. and a barrel of cement as 4 cu.ft.

In mixing the concrete the method of gaging the proportions must be accurate and the operation of mixing it by hand must be done on suitable mixing boards. The inspector must see that the concrete is deposited as quickly as it is mixed.

When a concrete mixer is used the inspector must acquaint himself with the theory and principle of operation of that particular type of mixer and be able to detect at any time any change in the proportion or uniformity of the mixture. When the mixer is of the automatic-feed type the inspector must test it at least once during each day's work, at times unexpected by the foreman, by feeding measured quantities of cement, sand and stone, in the proportion specified, into the respective hoppers. If the mixer is gaged properly and feeding freely the measured quantities of materials will be exhausted simultaneously. Should some cement be retained in the cement hopper after the sand and stone are exhausted it is an indication that the mixer is either improperly gaged or that the cement feed is clogged. Whatever the trouble is it must be corrected before the mixing is allowed to continue.

ACCURACY OF MIXER SHOULD BE TESTED

When the contractor employs a concrete mixer into which the materials are not loaded in batches the inspector should not depend for the securing of proper proportions on the accuracy of the machine gaging or the proportion of the shovelers used. The material must be placed in properly proportioned piles, not containing more than 10 cu.yd. in the case of sand, broken stone or gravel, and the inspector must see that the machine exhausts all material simultaneously. Should it be impossible to obtain these results, due to improper piling of material, the inspector must require the use of measuring boxes for proportioning the charges for the mixer.

The test for the degree of mixing or turning will be that all fragments of stone are fully covered with mortar. Grouting of concrete after it has been laid, or the application of neat mortar to the surface, and the sweeping of the surface with street brooms to make it smooth or to cover up defects must not be permitted. Concrete made of fine stone in the stated proportions of mixture may be used for leveling depressions.

The inspector shall see that the concrete is protected from injury while setting and that no hauling or trucking is done over it except on planks, and only after a proper hardness has been reached.

The principal care of the inspector should be to see that the asphalt is not laid at too low a temperature. The minimum temperature permitted by our specifications is 250 deg. F. While the main or interior mass of a wagonload may be well above that temperature, the top and outer part of the load may be, particularly in cold weather, too cold to be safely used. Some of this colder portion may be sufficiently reheated by mixing it with the hotter material, if properly handled in unloading, but any material that is so cold as to be lumpy when unloaded, or, more particularly, when being raked out, should be discarded. This applies to both surface and binder mixtures. The best practical guide is the manner in which the mixture behaves in raking. It should always be so hot that it will, under the rake, break up into a uniform crumbling or powdery mass. If it does not do this it is too cold, whatever its temperature may be.

Before the binder is laid all loose material, rubbish, street dirt and other matter foreign to the concrete surface shall be removed and the concrete surface swept, with street brooms if necessary, properly to clean it. Neither binder nor surface mixture shall be laid upon wet surfaces. Before the spreading of the surface mixture on the binder the latter must be cleaned of all foreign matter and swept if necessary. If the binder course already laid has become covered with mud from wagons or other travel it must be swept clean. No loose fragments of binder material must remain on the surface. Any part of the binder course that may have become broken or loosened must be taken up and new material laid in its place with the same care as the original.

HOW BINDER COURSE IS LAID

Nearly the same care in raking and equally as careful rolling should be required as for the surface course. If the binder is not thoroughly compressed and becomes cold before the surface course is laid it is likely, in the future hot weather, to soften and yield under heavy travel, and thus start small depressions in the pavement.

The joints against a cold edge of previously laid surface must be cut back until solid, fully compressed material of full thickness is reached and the raw edge completely but thinly painted with liquid bitumen. No masses or fragments of cold mixture must be allowed to remain on the surface of the binder, in advance of the placing of the surface course, to be covered up by the latter.

Such cold masses will not be compressed by the roller, but will later, under the hot sun and heavy travel, yield and start depressions in the pavement. Raking requires skill and the tines of the rake must penetrate to the binder, so that the raked material will be a uniform mass from top to bottom.

The inspector must insist upon the roller being placed upon the freshly raked surface just as soon as the material will bear it without being squeezed out or displaced laterally. The tendency is to keep the roller off too long, thus permitting the chilling of the surface and preventing its proper compression. The inspector must not take the contractor's word as to how soon the rolling may be begun, but should have trials made until he is able to judge for himself. The rolling of the heavy roller should be very thorough; the roller should be kept at work constantly until the surface is too cold to be impressed. In operating the roller lengthwise of the street the rolling should begin at the gutters and work toward the center of the street whenever practicable. Cross rolling and diagonal rolling must be insisted upon wherever the width of the street will permit.

Asphalt surfaces must not be laid when rain or snow is falling or so long as the surfaces are wet. Surface mixture raked out and caught in a shower before it is well enough rolled to exclude water must be taken up and discarded.

CARE NECESSARY FOR BLOCK PAVING

The more important things for the inspector to look after are: (a) The quality and shape of the blocks, (b) the sand cushion, (c) the setting of the blocks, (d) the ramming of the surface and (e) the filling of the joints.

Assuming that the general quality of the stone has been approved, the inspector will need only to observe and reject blocks made from soft, weathered or otherwise defective stone. Any material divergence from the correct form or from the sizes specified as permissible will be readily caught by the eye as the blocks are brought to the street and such defective blocks thrown out. The proper dressing of the blocks is important and should be watched carefully. While the inspector is not expected to examine each individual block, close observation of the blocks as they are handled and laid will enable him to detect and reject those that are materially defective in shape or dressing, or excessively wide joints will call attention to them as they are set.

Screened sand must be used for the cushion bed. It should be moderately coarse and must be fairly clean and pure. The tendency with contractors is to use any dirty sand or sandy loam available on the street. Such material, especially if it becomes filled with water, will yield under the blocks and will not support them properly. The sand bed should not vary materially in thickness. It should be laid and graded not more than 50 ft. nor less than 20 ft. in advance of the setting of the blocks.

SETTING THE BLOCKS

Blocks of uniform width and depth must be selected for each course, and each block must be laid upon a full bed of sand and "struck in" at the base, so as to bring the stone in close contact with its neighbor in the preceding course, and thus to insure the closest possible joint. The inspector must see that the joints in the line of traffic are close and that the alignment of the courses is true. This is most important, as a crooked or wavy course lessens the chances of getting close joints, not only along that particular course but along the courses that are to follow. The inspector must see that all longitudinal joints are broken by a lap of at least 3 in.

The operation of ramming is not to be permitted to approach within 20 ft. of the end of the paving. After ramming the surface of the pavement may look somewhat wavy and uneven. The inspector must then see that it is back-rammed. All blocks below the general plane of the surface must be raised and more sand placed thereunder and the blocks rammed again to an even bearing.

Whether sand or grit is used for partly filling the joints before paving cement or pitch is poured, care must be exercised in placing the sand or grit in the joints. Dumping a wheelbarrow load on the surface and then sweeping the joints full is not to be permitted under any circumstances. Sand and grit or gravel should be dried before being used and put into the joints as nearly as possible to a uniform height, as called for in the particular class of granite pavement. For pitch joints the contractor shall remove the gravel for the depth of about 1 in. below the surface before applying the pitch. The latter should be poured into the joint while at such a temperature as to be perfectly fluid.

USE CARE IN CLIPPING OLD BLOCKS

In clipping, care should be taken that all blocks are of as nearly uniform size as possible and that the sides are even and square, in order to insure uniform width of joints. Any block that falls below the minimum specified size after clipping must be rejected. The inspector must use special care in the inspection of brick, asphalt or other artificial block and prevent the use in the pavement of any broken, chipped or otherwise defective blocks. A contractor will often use such brick and lay them with the defective side or face next to the sand cushion. This should not be permitted. The contractor should not be allowed to fill the joints of any stretch or section of paving with cement, pitch or other filler until such paving has been thoroughly examined by the inspector for defective blocks and such blocks replaced by perfect ones.

However carefully lumber may have been inspected before its manufacture into blocks the subsequent seasoning, treating and handling will develop many defects and they will need close observation.

Under certain conditions wood blocks will develop a great many "season cracks," which should not condemn them unless the cracks open for the full depth and to more than one-third of the thickness of the block. "Shakes" result from the separation of the wood along the growth rings and if well defined or open should condemn the block, though in many cases the blocks, after the defective part has been trimmed off, may be used.

The inspector shall see that the required crown is given to the concrete before the same is set, as on account of the even size of blocks any inequality of foundation more easily affects the surface. When these blocks are to be placed under the head of the rail, as in T-rail, the inspector should see that they are placed tight against the web of the rail and that all voids are completely filled, to avoid any loosening by the action of the cars on the adjoining rail.

INSPECTION OF MACADAM PAVING

The inspector must see that the stone is spread in a uniform layer to the specified depth before rolling and that the rolling is continued until the stones are thoroughly settled into place and show no movement under the roller. The inspector should see that the binder is applied in thin layers and that it is not rolled until dry. The application of binder with intermittent rolling must be continued until all the voids in the stone are filled. Water should then be applied in such quantities that a wave of mud forms in front of the roller. The rolling must continue until the pavement is thoroughly consolidated.

The inspector should see that the road is again rolled after the final coat of screenings is spread over the surface. He shall not accept the same until the surface becomes thoroughly consolidated, hard and smooth. Before the application of a bituminous dressing the inspector must see that the surface is so swept that the ends of the 1½-in. stones are exposed. Such dressing must not be applied except when the temperature is above 50 deg. F. and the weather is clear.

The inspector should bear in mind that the foregoing instructions are general and intended as a guide to be used in connection with and as a supplement to the contract form and specifications. He must not conclude that because no mention is made of some specification provision in these instructions they are of minor importance and may be neglected or violated. The contract specifications govern in every case and he should be held to strict accountability for the enforcement of every and all provisions contained therein.

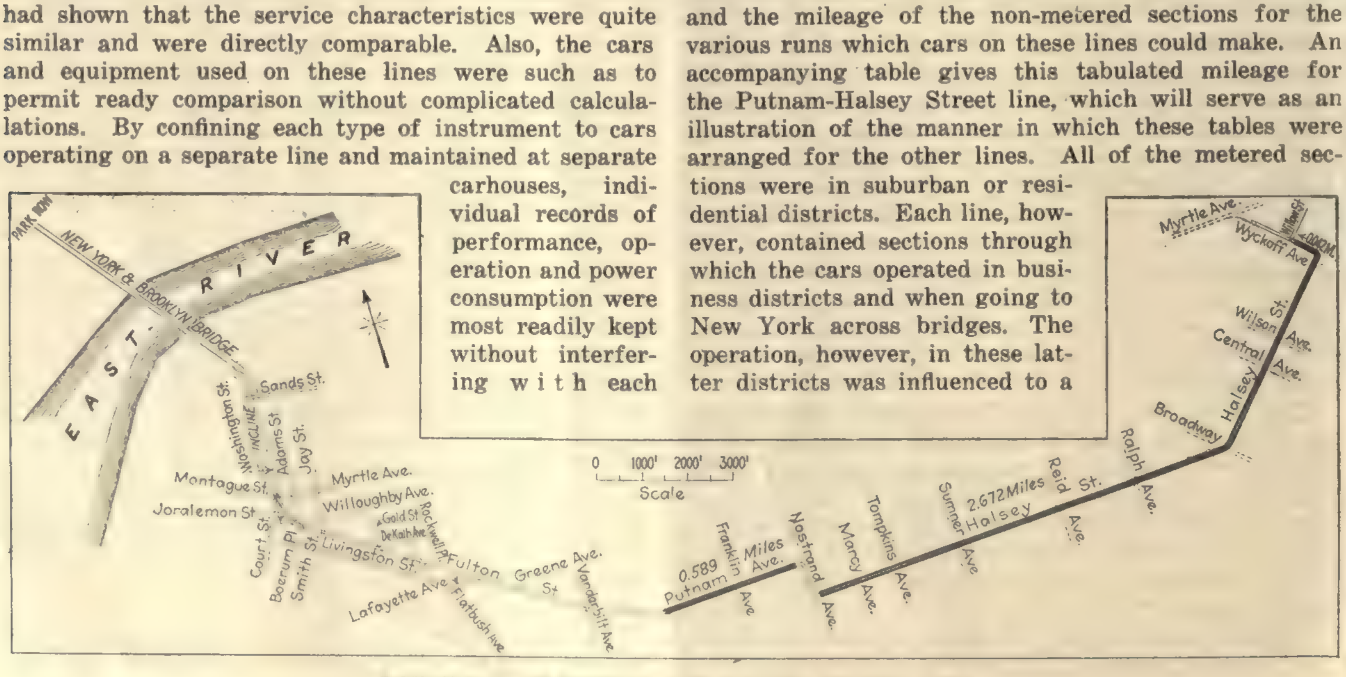
It is believed that most engineers will admit the desirability of securing the services of a competent inspector on paving work, as much so, in fact, as is true in the case of purchasing track or other materials under specifications. It will also probably be conceded that the ordinary laborer or inexperienced engineer would not possess the qualifications necessary to fit him for the work, since, if he does his work properly, he must not only be on the job all the time but must possess certain qualities of judgment which can only be gained through experience and practice. This argument being sound, it is evident, then, that the best results can only be expected through the employment of trained and competent inspectors, and the above outline of some of the points which the latter should be required to look after may serve as a guide where men are being trained for this work.

Power Saved by Use of Checking Devices

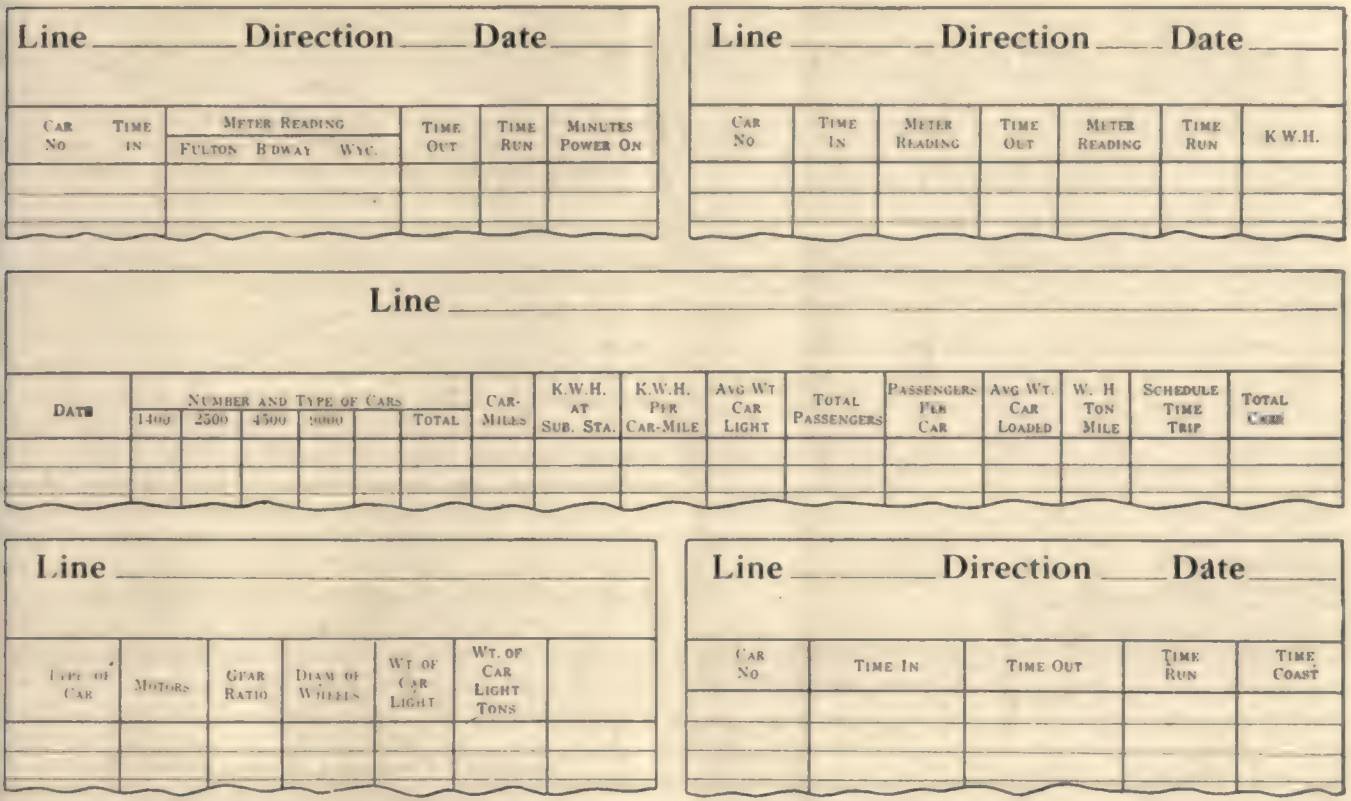
Results of a Very Thorough Test Made in Brooklyn (N. Y.) Show That the Economies Effected by a Properly Organized Power-Saving Campaign Should Exceed 15 per Cent

IN ORDER to determine the efficiency of the principal types of car-energy-checking devices now being used, the Brooklyn Rapid Transit Company inaugurated a test during the latter part of 1919. Three different types of these checking instruments were tested, and a sufficient number of each type was used completely to equip three separate lines of the system. In this test 220 cars were used.

Forty-four cars were equipped with coasting recorders of the Rico type and were placed in operation on the Flatbush-Seventh Avenue line. One hundred Economy kilowatt-hour meters were installed on cars and placed in operation on the Greene and Gates Avenue line. Seventy-six Arthur power-saving recorders were installed on cars and placed in operation on the Putnam and Halsey Street line. Previous tests on these lines had shown that the service characteristics were quite similar and were directly comparable. Also, the cars and equipment used on these lines were such as to permit ready comparison without complicated calculations. By confining each type of instrument to cars operating on a separate line and maintained at separate carhouses, individual records of performance, operation and power consumption were most readily kept without interfering with each other. Before this test was started certain sections of all the lines on which it was to be conducted were arranged so that all energy supplied to them was metered through Sangamo kilowatt-hour meters installed in the substations supplying these sections. An accompanying illustration shows a map of the Putnam-Halsey Street line, on which the metered sections are indicated. This arrangement is typical of that which was used on the other lines and serves to illustrate the methods by which accurate readings of the power consumed in operation were obtained for comparable sections over which cars equipped with different types of instruments were operated. In order to facilitate the calculation of the mileage made in metered and non-metered sections by the various cars a table was made for each line, giving the total mileage, the mileage of the metered sections and the mileage of the non-metered sections for the various runs which cars on these lines could make. An accompanying table gives this tabulated mileage for the Putnam-Halsey Street line, which will serve as an illustration of the manner in which these tables were arranged for the other lines. All of the metered sections were in suburban or residential districts. Each line, however, contained sections through which the cars operated in business districts and when going to New York across bridges. The operation, however, in these latter districts was influenced to a



ROUTE MAP OF PUTNAM AND HALSEY STREET LINE



Line ______ Direction ____ Date ______

Car No	Time In	Meter Reading			Time Out	Time Run	Minutes Power On
		Fulton	B'way	Wyc.			

Line ______ Direction ____ Date ______

Car No	Time In	Meter Reading	Time Out	Meter Reading	Time Run	K.W.H.

Line ____________

Date	Number and Type of Cars						Car-Miles	K.W.H. at Sub. Sta.	K.W.H. Per Car-Mile	Avg Wt Car Light	Total Passengers	Passengers Per Car	Avg Wt. Car Loaded	W. H Ton Mile	Schedule Time Trip	Total Cars
	1400	2500	4500	9000		Total										

Line ____________

Type of Car	Motors	Gear Ratio	Diam of Wheels	Wt of Car Light	Wt. of Car Light Tons	

Line ______ Direction ____ Date ______

Car No	Time In	Time Out	Time Run	Time Coast

FORMS USED FOR RECORDING TEST DATA

large extent by traffic and service conditions which if considered would introduce too great a variation to insure accurate comparison.

Frequent and recent tests had been made of the operation of the cars and equipment over these lines for other purposes, so that a large amount of data was available for use regarding the service characteristics of each section. These data included such records as scheduled speed, number of stops per car-mile, average duration of stops, average number of passengers on car at one time, and other similar data of value and interest in making comparisons.

ROUTE MILEAGE FOR PUTNAM AND HALSEY STREET LINE

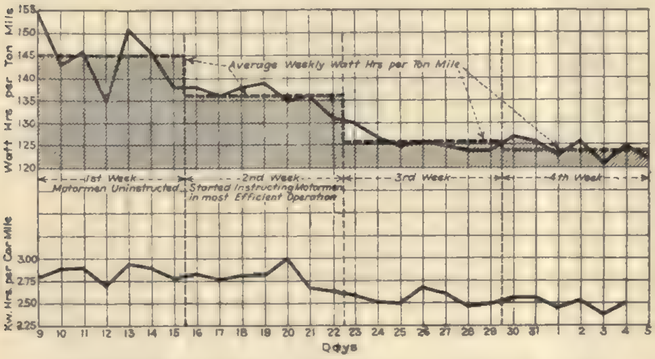
Route	Metered Section	Non-Metered Section	Total Mileage
Ridgewood depot to Wyckoff and Halsey	0 042	0.314	0.356
Wyckoff and Halsey to Park Row via Fulton Street	3 261	3.524	6 785
Wyckoff and Halsey to Park Row via Livingston Street	3 261	3 703	6 964
Wyckoff and Halsey to Borough Hall via Fulton Street	3 261	1 946	5 207
Wyckoff and Ha'sey to Borough Hall via Livingston Street	3.261	1.947	5 208
Wyckoff and Halsey to Fulton and Flatbush Loop	3 261	1 331	4 592
Wyckoff and Halsey to Halsey Street Depot...	0 976	. .	0 976
Halsey Street Depot to Park Row via Fulton Street	2 285	3 524	5 809
Halsey Street Depot to Park Row via Livingston Street.	2 285	3 703	5 988
Halsey Street Depot to Borough Hall via Fulton Street	2 285	1 946	4 231
Halsey Street Depot to Borough Hall via Livingston Street	2 285	1 947	4 232
Halsey Street Depot to Fulton and Flatbush Loop	2 285	1 331	3 616
Halsey and Reid to Park Row via Fulton Street	1 621	3 524	5 145
Halsey and Reid to Park Row via Livingston Street	1 621	3 703	5 324
Halsey and Reid to Borough Hall via Fulton Street	1 621	1 946	3 567
Halsey and Reid to Borough Hall via Livingston Street	1 621	1 947	3 568
Halsey and Reid to Fulton and Flatbush Loop.	1 621	1 331	2.952
Halsey and Nostrand to Park Row via Fulton Street	0 589	3 524	4 113
Halsey and Nostrand to Park Row via Livingston Street	0 589	3 703	4 292
Halsey and Nostrand to Borough Hall via Fulton Street	0 589	1 946	2 535
Halsey and Nostrand to Borough Hall via Livingston Street	0 589	1 947	2 536
Halsey and Nostrand to Fulton and Flatbush Loop	0 589	1 331	1 920
WYCKOFF AVENUE SHUTTLE			
Wyckoff Avenue and Halsey Street to Myrtle Avenue..............................	0.042	0 364	0.406

At the beginning of the test, cars were operated for one week with covers installed over the car instrument faces, so that they could not be read by the motorman. During this period the motormen were supposed to operate in the normal manner in which they had been in the habit of operating their equipment and without particular regard to any great saving in power. During this period, however, records were kept at the substations of the power consumed in the metered sections and records of the equipment used and service characteristics were also kept. These included the number and type of cars operated, the car-miles made, the average weight of the cars, light, the total number of passengers carried, the average passengers per car, the average weight of the car loaded and the scheduled time for the trip. This information, together with the power readings at the substation, enabled computations to be made showing the kilowatt-hours per car-mile and per ton-mile consumed. All this information was carefully tabulated and plotted in the form of graphs for convenience in comparison. For the convenience of those designated to obtain and record this information, various forms were prepared with spaces to be filled in for tabulation. An accompanying illustration shows the headings for some of these forms.

The test was started July 9, 1919, and the preliminary operation with the car power-checking device faces covered ended July 16 at 6 a.m. On that day all instruments were immediately inspected and the shutters were removed from the meter faces. On July 17 readings were taken of the various power-checking instruments installed on the cars by inspectors in order to obtain a comparison of the data recorded on the car and the power furnished by the substation as indicated by the kilowatt-hour meters. A relation was thus established between the amount of power supplied to the various sections and the amount of coasting as indicated by the cars equipped with coasting recorders, the number of minutes that power was applied as indicated by cars having power-saving recorders and the kilowatt-hour readings as indicated by the instruments on cars with watt-hour meters. Graphs were plotted showing these various relations, together with ratio of kilowatt-hours consumed at substations to car-miles operated.

MOTORMEN INSTRUCTED IN PROPER OPERATION

On July 18 representatives of the several power-checking-device companies visited the inspection depots and explained to the motormen the working of their devices and began instruction in connection with the proper handling of cars so that the men would be able to make the best possible records. The test, together with the recording and calculation of data, then proceeded and various graphs were plotted to show the improvement made by the use of the various devices and the results of the power-saving campaign.



AVERAGE POWER CONSUMPTION GRAPHS FOR TEST PERIOD

It is not the intention of this article to give any comparisons of the various power-checking instruments or the results accomplished by each individual type of instrument, but rather to give general data which might apply to any type. With this idea in view a composite graph has been plotted showing the average watt-hours per ton-mile and the average kilowatt-hours per car-mile which were obtained for the three lines on which the tests were conducted. The average weekly watt-hours per ton-mile for all the lines is also shown. By comparison of these, it will be seen that the average for the fourth week is aproximately 15 per cent less than the average obtained for the first week, before motormen were instructed in the use of the devices.

In general this saving would indicate that if a power-saving campaign would result in the same saving for all the cars operated by the Brooklyn Rapid Transit system the first cost of the power-checking instruments could be saved in from two to three months, and that a further saving of less than 1 per cent would be sufficient to carry the cost of inaugurating a power-saving campaign and maintaining the power-checking instruments as well as covering all carrying charges and operating expenses for the carrying on of this work. Some very surprising results were also indicated as to the difference in power consumption used by a good motorman and a careless one. This ratio considered on a power consumption basis was about in the ratio of 2 to 1.

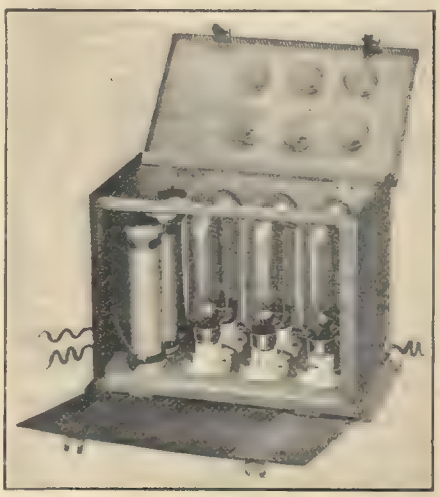
Electric Locomotive Versus Motor Cars

OWING to the intensive study being given to heavy electric traction in Great Britain, the railway papers in that country are considering carefully the several phases of the problem of substituting electric for steam motive power. In its November issue the *Railway Engineer* of London editorially rather favors the locomotive, stating that one of the chief factors which will make for the adoption of electric locomotives for main-line passenger work, rather than motor coaches in conjunction with trailers, is that it will enable the present rolling stock to be employed. On many systems the main-line stock is of high class and capable of being used for many years. The necessity for rendering this obsolete would mitigate against the gradual electrification of the main lines. It would, of course, states the *Railway Engineer*, be possible to convert existing stock to enable it to run as trailer coaches in multiple-unit trains, but the adoption of electric locomotives would obviate this. Again, with electric locomotives the dividing of trains at junctions, slipping of coaches and working of rolling stock over foreign lines all become possible. The use of the electric locomotive also removes from the passenger coaches the noise and vibration inseparable from the motor coach.

Constant Current Regulation for Incandescent Headlights

THE General Electric Company, Schenectady, N. Y., has developed an automatic regulating device which maintains practically normal voltage on the headlight lamps with varying trolley potential. This is called the "Geco Resistor" and has a low initial cost and its maintenance is also very inexpensive, as there are no moving parts or contacts to get out of order.

The device consists of six units mounted in porcelain sockets and three resistance sticks, two of which are used to dim the headlight within city limits. The third stick is to adjust the "Geco" for the maximum trolley voltage of the system. These elements are encased in a perforated metal housing equipped with hinged covers, which provides ready accessibility. On the top cover six conical springs hold the resistor units firmly in the sockets. The "Geco Resistor" has a positive temperature coefficient. With a drop in trolley voltage the resistance of the "Geco" becomes correspondingly less, thus maintaining practically constant current through the headlight lamps. A rise in trolley voltage causes the resistance to increase and governs the flow of current in a similar manner. A special incandescent headlight lamp must be used when operated with the "Geco Resistor."



NEW TYPE RESISTOR FOR INCANDESCENT HEADLIGHTS

Fuel and Transportation the Leading Topics

Mechanical Engineers Hold Annual Convention in New York—Railroad, Motor Truck and Waterway Transportation Discussed — Fuel Sessions Are Well Attended—Wood Floors for Shops and Factories Form Topic of the Forest Products Session

THE forty-first annual meeting of the American Society of Mechanical Engineers was held in the United Engineering Societies Building, New York City, Dec. 7-10, inclusive. The program included a large variety of subjects and separate sessions were held under the auspices of the various sections devoted to fuel, forest products, machine shops, management, railroads, design, research, transportation and power. In addition to the program of papers excursions were made to neighboring power stations and a varied series of informal entertainments was also provided.

The feature of the fuel session, which was held on the afternoon of Tuesday, Dec. 7, was a symposium of papers on fuel supply, conservation and production. This session was opened by Prof. L. P. Breckenridge, Yale University, with a discussion of the fuel supply of the world. The latest available data on the supply, production and use of the various fuels were shown graphically in the form of curves and charts. A few statistics are well worth remembering. Over half the world's supply of coal is located in the United States; about 40 per cent of the annual production of the world's coal is mined in this country, and the annual production in the United States is about 500,000,000 tons of bituminous and about 85,000,000 tons of anthracite coal. The supply of fuel oil in the United States it is estimated will be used up in from twenty to thirty years. Our production, which is about 356,000,000 bbl. annually, is 60 per cent of the world's total output. Professor Breckenridge emphasized the statement that the time has arrived when the fuel problems of the world must be given consideration in a large way. In his plea for thrift and conservation he says:

Suggestions by L. P. Breckenridge for Preventing Waste of Coal

1. Extend improved mining methods.

2. Extend improved methods of preparation of coal at the mines.

3. Reduce hazards of coal mining.

4. Operate mines a maximum number of days per year.

5. Utilize mine waste.

6. Increase use of byproduct coke oven.

7. Extend use of blast-furnace gas for power generation.

8. Extend use of gas producer, gas and heavy oil engines.

9. Develop waterpower.

10. Better the performance of steam locomotives.

11. Purchase of power by small industrial plants.

12. Furnish owners of homes and public buildings with correct and simple instructions for heating.

13. Extend "custom" of coal shortage to induce storage of coal when demand is low.

14. Extend electrification, as the full use of electrical energy offers the most promising means of saving coal. Conservation by co-operation of water power, steam power and electricity opens up large possibilities for saving fuel, capital and labor as outlined in Mr. Murray's super-power scheme.

"The difficulty of securing a supply of coal, coupled with the high price paid for it, has itself brought about a desire to exercise all possible care in its use. The public at large more and more realizes the need of co-operation to secure conservation in some large way. It is in connection with the last plan, 'Co-operation for Conservation' rather than 'Individual Thrift,' that the writer sees the most promising chance for initial success. Especially is this true as a wise first step. Individual thrift should always be practiced, but the large savings of fuel that could be made by co-operation are way beyond anything that would be expected from individual effort. The suggestions for coal conservation which are given are not new; some of them have already begun, but it is only when all of them are fully realized that we shall be able to feel that we are really making satisfactory progress in preventing waste of fuel as well as waste in labor and capital which are required to produce and transport fuel."

The next speaker, David Moffat Meyers, New York, in his paper on fuel conservation, laid much stress, as did Professor Breckenridge, on the need of a definite fuel conservation policy. He said that prevention of waste and conservation involve no experimental features, but merely require the application of well-known engineering principles. How vital the fuel question is as a national issue is not yet realized by the public at large, but when this realization comes a solution may be looked forward to which will check this great and uncontrolled waste.

At the forest products session, held Tuesday afternoon, papers were presented describing various features of the woodworking industry and the equipment and machinery used in wood construction and preservation. A paper on "Creosoted Wood Block Factory Floors," by L. T. Ericson, chief engineer of the Jennison-Wright Company, Toledo, Ohio, is of interest in connection with electric railway shop floors. Mr. Ericson said that the creosoted wood block flooring is a logical development from street paving, but in this development a great many mistakes have been made due to a misunderstanding of the problems involved. The principal reason for most of the troubles encountered with this type of flooring is the fact that wood expands and contracts with various conditions of atmosphere and the moisture content of the blocks. It is, therefore, necessary to lay the individual blocks in such a way as to allow for this change in volume, which in extreme cases may be as much as 5 per cent. The individual units in the floor must be bound tightly in place with a binder which will allow for expansion and contraction and which will exclude water from the under side of the floor. As long as the blocks are held tightly and firmly in place and a smooth surface is maintained the floor will wear almost indefinitely, but as soon as the blocks become loose and the surface becomes rough they will break up into sticks very quickly. The three most essential requisites for success are to use thoroughly air-seasoned lumber, to provide a smooth solid foundation base and to have a waterproof and elastic binder for holding the units in place.

CONDITIONS TO BE MET IN A SUCCESSFUL INSTALLATION

The majority of floors are dry most of the time, consequently the lumber should be thoroughly seasoned in order to keep the shrinkage to the minimum. Blocks cut from green or semi-dry lumber will shrink in volume to such an extent that they will often have to be taken up and relaid. If it is possible to do so it is advisable to use a concrete base for the installation of these floors. The base should be strong enough to carry the entire load and should be finished smooth and level so that it will not be necessary to use a cushion between the concrete and the blocks in order to secure a level floor and uniform bearing for the individual units.

> **The people do not desire government ownership and operation, and I believe that they are willing to pay such rates and charges as may be necessary to secure successful private operation provided that the roads under private management are able to give and do give such service as the public reasonably desires and is entitled to. If they fail to do this the public will demand a change.**
>
> —DANIEL WILLARD.

The use of a sand cushion between the blocks and the concrete, which was almost universally used a few years ago, was largely accountable for a great many of the failures. Sand shifts easily under traffic and heavy loading and also affords pockets for the collection of moisture under the floor. Wherever a cushion is necessary between the concrete and the blocks it is advisable either to use a mixture of portland cement and sand or a bituminous mastic. The latter is preferable in a great many cases on account of being both waterproof and elastic. The sole functions of a cushion should be to level up the inequalities of the base and, in the case of the bituminous cushion, to furnish a waterproofing membrane on the under side of the floor. It is standard practice today to lay the blocks directly upon a smoothly finished concrete base without any cushion whatsoever. It is also customary to give the base a thin, even coating of coal-tar pitch before installing the blocks so that the under side of the blocks may be thoroughly sealed and made waterproof.

The elimination of cushions and the use of a successful waterproof binder in the joints of the blocks, thereby eliminating the possibility of shifting of the base and a loosening of the units, has permitted a reduction in the depth of the blocks used. Factory floors are now being very successfully installed throughout entire manufacturing plants with blocks as shallow as 2 in. in depth.

For dry locations the blocks should be driven up tightly together when installed; there is a tendency, however, for a slight further contraction in the volume of air-seasoned blocks when placed in the floor of a steam-heated room, and therefore it is necessary to provide a binder in the joints to hold the blocks in place after this contraction has occurred and to exclude moisture and foreign matter from seeping under them.

Floors which are to be subjected to considerable moisture or to weather conditions should be laid with ample provision for expansion. It is good practice to provide ample space between the individual units to take care of this expansion. These joints should be flushed full of a waterproof, elastic binder, which should preferably be coal-tar pitch of a consistency which will not soften up under atmospheric or room temperatures.

The progress report of the research sub-committee on "bearing metals" was made at the business meeting on Wednesday, Dec. 8. In this report is described an instrument recently perfected, called the microcharacter, to determine the microcharacteristics of alloys. By means of the use in this instrument of a very accurately cut sapphire point instead of a needle point it has been possible to formulate a tentative scale of microhardness. This instrument makes it possible to test not only various bearing alloys but also steels suitable for journals whether hardened or soft.

A paper on "Static Adjustment of Trucks on Curves" was presented by R. Eksergian, Baldwin Locomotive Works, at the railroad session on Wednesday afternoon. The adjustment of the running gear of a locomotive on curves and the lateral reactions developed are considered from geometrical limitations imposed which govern the length of wheelbase, and the lateral displacement of trucks, together with a study of lateral devices for exerting guiding reactions between truck and the frame of the rigid wheelbase. The speaker then considered the effect of the major lateral reactions developed between the various parts of the running gear.

The effect of the centrifugal force and the overturning moment which it produces, resulting in a change of load on the non-crossed part of the equalization, was next discussed in order to arrive at the proper journal load in the design of the driving and trailing-truck axles. The principal reactions developed in a two- and four-wheel engine truck and formulæ for the flange reaction of the guiding axle are derived in terms of the lateral force exerted at the center pin of the truck. An analysis is made of the lateral forces developed in skewing the rigid wheelbase of a locomotive in curve. Finally formulæ for proper guiding and maximum flange reactions for the entire running gear are developed for three common types of locomotives.

MR. WILLARD REVIEWS TRANSPORTATION SITUATION

At the session on transportation, the leading address was by Daniel Willard, president of the Baltimore & Ohio Railroad. The keynote of Mr. Willard's address was his recommendation to the Council of National Defence of November, 1917, from which he quoted:

> A nation should have a national transportation system and such a system should embrace and make proper use of all available and suitable agencies. The fullest possible economic co-operation should be encouraged and required between all such agencies. Inasmuch as the business of transportation for hire partakes of a monopolistic character, all agencies so used should be subject to governmental regulation in the public interest.
>
> * * *
>
> Among the many agencies of transportation the following are in most common use: The natural and artificial water-

ways, with the various craft designed to operate thereon; the highways, with the different vehicles and contrivances designed to operate thereon, and the specialized roads, such as electric and steam railways, with the special equipment designed for each. Other agencies may be developed.

* * *

The co-ordinated transportation system of a nation should be so adjusted that each agency will perform the particular function for which it is best adapted, and, speaking broadly, that country which is provided with the most efficient transportation system—other things being equal—ought to be the most prosperous.

He then reviewed what the railroad had done in the period during and subsequent to federal control and emphasized that what had been shown was that if the country is to have a completely articulated transportation system this can be done only by the co-ordination of different transportation agencies, including steam and electric railways, coastwise and inland waterways, the highways, improved and unimproved, the motor truck, etc.

He said he feels sure that the people do not desire government ownership and operation, and he believes that they are willing to pay such rates and charges as may be necessary to secure successful private operation provided that the roads under private management are able to give and do give such service as the public reasonably desires and is entitled to. If they fail to do this the public will demand a change.

He said further that it is in the larger public interest that each transportation agency should be used to the extent that it is economically desirable. To give less use than that of each agency would be wasteful. Some who were interested in a particular agency have tended in the past to try to extend its use beyond proper economic limits, and such mistakes should be avoided. He emphasized the proper economic place of the motor vehicle in short-distance traffic in conjunction with the railway. He closed by saying:

"Whatever may have been the attitude of the railway managers in the past, that is not their attitude at the present time, and I am certain that they will be glad collectively or individually to co-operate with all other transportation agencies in such way as will inure to the greatest public good, because in the end all enterprises of an individual character must be tested by that rule. Whatever contributes to the public good is likely to endure, and anything inimical to the public good is certain to fail."

FEEDERS FOR RAILROADS DISCUSSED

Charles A. Morse, chief engineer Chicago, Rock Island & Pacific Railroad, then addressed the meeting on "Feeders for Railroads." He traced the development of small branch lines from the early days when they could use equipment transferred from main lines to the present, when main line equipment is too heavy for branch line use.

Today, he says, the situation has changed and it is doubtful if branch lines which feed main lines can be substantiated economically. It will bear careful investigation to see whether or not branch rail lines should not be discontinued and their work taken over by motor trucks on hard surfaced roads which the public is compelled to support by taxation anyway. It is not fair to tax main line passengers to support branch lines, and where branch line facilities are continued their extra cost should be charged to those they serve.

After a paper on inland waterways, Francis W. Davis of the Pierce-Arrow Motor Car Company presented a paper on motor trucks, discussing this subject under three heads, first, the field; second, the present status, and third, the improvement of truck transportation.

The field he defined as being in the short haul and at terminals for the motor truck; and as a supplement to electric railways, for the motor bus. Motor transportation is an ally of rail transportation and releases cars for long hauls, where they are most efficient, and acts to conserve rail equipment in general.

Mr. Davis gave figures to show the relative cost and time of shipping by rail and truck for various lengths of haul, from which he concluded that the economical limit where rail was cheaper than truck was about 70 miles. He discussed at length the present status of the motor truck transportation and suggested as improvements for the future development of the highways, to which, he says, the motor vehicles contribute materially in license fees.

He made the final point that the motor industry as a whole will welcome sound and uniform legislation and will aid in securing it.

Whatever contributes to the public good is likely to endure, and anything inimical to the public good is certain to fail. DANIEL WILLARD.

* * *

Motor transportation is an ally of rail transportation and releases cars for long hauls, where they are most efficient, and acts to conserve rail equipment in general. FRANCIS W. DAVIS.

At one of the other sessions of the convention Gustav Lindenthal presented a paper on "The Transportation and Terminal Problem of New York as Affected by the Hudson River." It will be recalled by readers of the JOURNAL that the general transportation problem in and around the metropolitan district of New York was discussed before the American Society of Civil Engineers, New York Section, recently, as reported in the Nov. 27 issue of the JOURNAL, page 1095. This paper of Mr. Lindenthal's should be read in connection with this previous discussion before the Civil Engineers.

Mr. Lindenthal gave many data which were presented at this previous transportation session regarding the population in New Jersey, which is really tributary to the city life of Manhattan in the same degree as the population of about the same size living on Long Island and separated by the East River.

To the local problem across the Hudson River, namely, that of transporting passengers, must be added the big problem of passenger and freight transportation from seven large trunk line railroad systems, and Mr. Lindenthal points out that with the exception of about 300,000 passengers all the rest of the traffic comes by floating equipment across the river as it did eighty years ago.

Mr. Lindenthal's concrete suggestion is the building of a bridge over the Hudson River, located at or below Fifty-ninth Street, where the banks on both sides are high and favorable for bridge construction. The proposed bridge would have two decks 180 ft. wide, the lower accommodating eight railroad tracks and two tracks for a moving platform, the upper deck being set aside for highway traffic, four lines of surface electric railways and twelve lines for vehicles, with two sidewalks.

Necessary connections between elevated railroads and the New York Central tracks along the riverfront on the West Side would be made, as well as with a proposed union passenger station.

Mr. Lindenthal compares the estimated cost of the bridge of $100,000,000 to the $400,000,000 estimate of twenty under-the-river tunnels which had been proposed to handle similar traffic. He also points out that the bridge would be constructed in much less time.

Mr. Lindenthal then analyzes the passenger traffic on the railroads, the street railways and the moving platform in its distribution on the Manhattan end. He further points out how freight transportation would be made and articulated with the distributing system on Manhattan Island.

One of the features of the plan is a moving platform which would cross Manhattan Island under Fifty-seventh Street and eliminate all crosstown surface passenger transportation for the large number of through passengers which would exist at that point following the completion of the bridge.

Sheet Asphalt Pavement Withstands Severe Service

REPLACEMENT of worn-out tracks in Main Street by the Memphis (Tenn.) Street Railway recently showed the extent to which sheet asphalt pavements will withstand heavy traffic when laid under strict engineering supervision and with proved materials. This asphalt pavement was put down in the fall and winter of 1904-05. The asphalt extended from curb to curb and was laid flush with the track rails. At the time the pavement was originally laid new 90-lb. steel rails were with one operation. Two castings used to support the that replacement was necessary and to carry out this work the asphalt was cut out along the double tracks, as shown in the accompanying illustration. The cutting disclosed that there was still 2 in. of wearing material left in the pavement. At a crossing at Main Street and Madison Avenue it was necessary to take out large sections of the pavement between the tracks in order to replace special trackwork. This pavement was also of asphalt and extended to the rails. The traffic to which it had been subjected was extremely heavy and the wear of the surface had been so uniform as to be scarcely discernible. For the original pavement construction Bermudez Lake asphalt was used. The contractor was the Hornaday Construction Company of Greenwood, Miss.

PAVEMENT CUT AWAY FROM TRACKS TO ALLOW REPLACEMENT OF RAILS

Saving Through Use of Anti-Friction Bearings

Tests Show Considerable Savings Result From Use of Anti-Friction Bearings on Railway Cars and Equipment

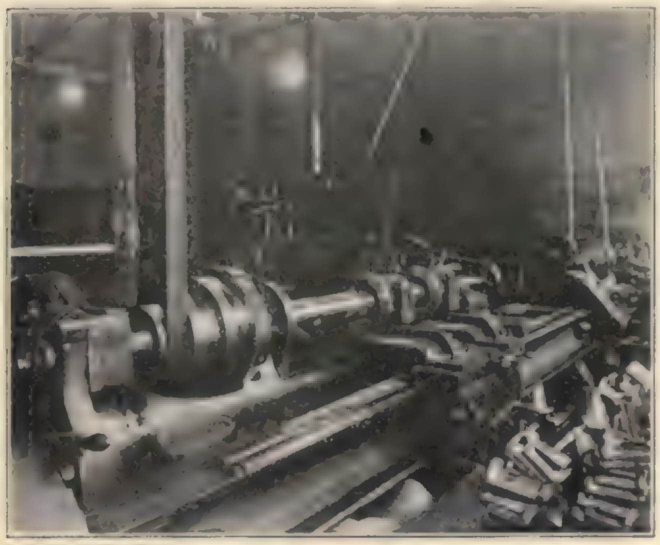
PROBABLY the most extensive use of anti-friction bearings has been on safety cars, and the mechanical troubles experienced with some types have raised a question as to the desirability of their use. The saving in power from the use of anti-friction bearings has been one of the greatest factors in favor of their use. Tests in this country and in Europe have shown savings in power costs of from 20 per cent to 30 per cent. These savings must necessarily vary with the weight of cars, loads, grades, curves, condition of the track, weather, speed, frequency of stops and skill of motormen. Some tests made by the Third Avenue Railway, New York City, showed a saving of approximately 25 per cent in power cost. The car tested weighed 18 tons and had the axles of eight wheels equipped with anti-friction bearings. The truck was a Brill 39-E Maximum traction type. The car was operated between the post office and Fort George, involving a mileage approximately 100 miles per day, with from eight to ten stops per mile.

Much of this saving is due to the decreased frictional resistance of the anti-friction bearings over the sleeve-type bearings in starting a car, and consequently the more frequent the stops and starts the greater will be this saving. Through this reduced friction the acceleration is also increased so that the current in the motors begins to fall off quicker. The coefficient of friction or the measure of frictional resistance for sleeve-type brass bearings on electric railway car truck journals at starting is from 5 per cent to 14 per cent, with an average between 9 and 10 per cent. The coefficient of friction for roller or ball bearings is less than 0.01 per cent. This decrease in journal friction causes a great reduction in the demands upon the motive power necessary to start and therefore this reduction can be applied to accelerating the car, with a consequent material reduction in running schedule.

Upon first consideration one is apt to assume that there will be no difference in the rates of retardation from the two types of bearings. But theoretically there should be an increased rate on cars having anti-friction bearings. The real limit to braking force of any car is the slipping or skidding point of the wheels on the rails. As soon as the wheels skid the retarding force is greatly reduced and a much longer stopping distance results. The usual type of friction bearing surrounds approximately only one-third of the circumference of the axle journals. This permits the brakes to push the wheels with the axle away from its bearing seat and positive resistance to the action of the brake does not occur. This yielding of the axle and wheels results in an unsteady or "chattering" action between the brake shoes and wheels which causes high and low spots in the braking effort produced. With this condition the wheels are more liable to become locked and slip. With anti-friction bearings the box entirely surrounds the journal, thus affording a positive resistance of the wheel to the brake shoes. This increase in retardation or the production of a more steady retardation also has its effect on the scheduled speed of the car and increases the miles per day that can be operated.

Boring Two Sets of Axle Bearings at Once

VARIOUS steps in the finishing of railway motor axle bearings as carried out by the Connecticut Company in its New Haven reclamation shop were described in the ELECTRIC RAILWAY JOURNAL for March 20, 1920, page 585. Since that time a further improvement has been put in use, as illustrated herewith, which makes it possible to bore out two sets of axle bearings with one operation. Two castings used to support the bearings during the boring operation are bolted to the carriage of the finishing lathe. The bearings previously finished on the outside are clamped in these supporting jigs, which provide for accurate lining up and centering, so that the inside when bored out will be central with the outside surface. The boring bar as shown in the illustration is driven by the head stock in the lathe centers. This boring bar has openings to receive the finishing tools, which are clamped securely in position by set screws. When once set up bearings can be readily removed and new ones inserted for boring without disturbing the boring bar or the bottom portion of the supporting jigs. A considerable saving in the time taken to finish axle bearings has thus been effected.



FINISHING TWO AXLE BEARINGS AT ONCE IN NEW HAVEN SHOPS

Careful Oil Handling Reduces Bearing Troubles

AMONG a number of causes leading to hot bearings it has been found that some are due to foreign material in the oil caused by improper handling. A recent publication of the Vacuum Oil Company, entitled "Bearings and Their Lubrication," gives some suggestions of interest.

When the barrels of oil are delivered by the manufacturer, it is important that they be stored under cover. They should never be left in the open exposed to the sun and rain. Rain water particularly, if the barrels are stood on end, will find its way through the staves and gradually dissolves the inside lining of the barrel, causing it to spread throughout the oil. When such oil is used the presence of the lining material will cause excessive heating of the bearings.

When a barrel is opened the bung should be started by striking the staves with a mallet. If an auger is used fine chips of wood and dirt from the outside of the barrel may easily find their way through the opening into the oil. In any case the oil should always be poured through a strainer into the oil can. If this is not done the small chips of wood and other impurities will go into the bearings, with disastrous results.

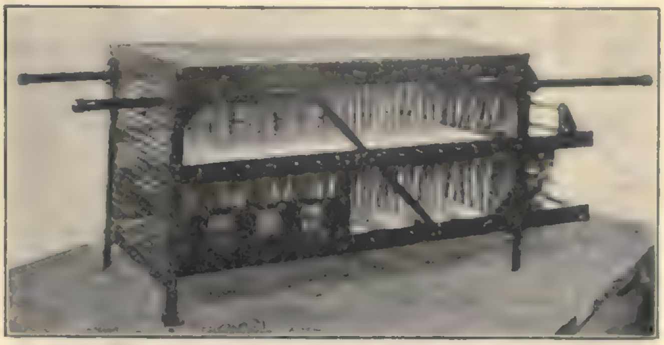
Dirty oil cans are responsible for many hot bearings and cans should therefore be kept scrupulously clean. The cans should be closed at the top or provided with covers, so as to prevent, as far as possible, the entrance of dirt. An oil can should never be used for more than one grade of oil, and in order to prevent mistake the name of the oil should be marked plainly on the can.

When the oil is drawn directly out of the barrels for use the overflow usually runs onto the floor or into "save-alls," which are not always clean. There is always the danger that some of this oil, including the dirt, will be used for lubrication. It is good practice to keep the oil in cabinets, preferably locked, so that the oil will not be tampered with by unauthorized persons. Oil waste may thus be minimized.

New Resistor-Type Arc Welder

THE General Electric Company has developed an electric arc-welding equipment incorporating new features, and especially adapted for welding rail bonds on electric railways. It is also applicable to welding work in shops where energy loss is not objectionable.

The apparatus consists of a wire resistance unit, mounted in a light metal frame, with suitable leads for connecting to the power supply circuit and to the electrode holder. Switches provide a welding current with range of from 60 to 200 amp. in 15-amp. steps. The complete device is easily portable by two men and will not be injured by exposure to the weather. The circuit is controlled through a contactor, operated by means of a push-button switch located close to the electrode holder. This arrangement permits the operator to open the circuit at a point remote from the weld and thus avoid flashing.



RESISTOR-TYPE ARC WELDER

New Adhesive Paper Tapes

THE Irvington Varnish & Insulator Company, Irvington, N. J., announces that it has just perfected a new line of adhesive paper tapes for use in insulating armature coils and for general railway repair work. These tapes can be furnished in widths from ½ in. up and in rolls of 10, 36, 72 or 100 yd. They are made with several different degrees of tackiness and are specially treated so as to retain their adhesive qualities over long periods so as to permit storing without danger of losing their effectiveness. They have a dielectric strength of 7,500 volts and also possess high mechanical strength.

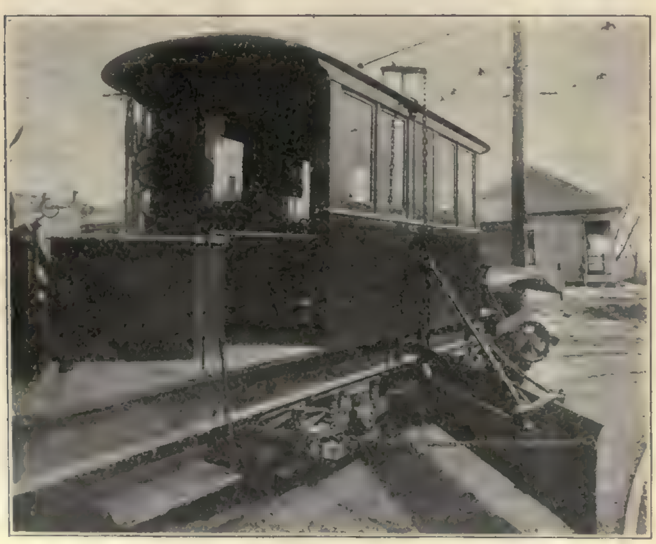
Special Design Sweeper Proves Efficient

Rotary Brush, Consisting of Broom Corn Reinforced by a Facing of Steel Bristles, Has Proved Both Effective and Economical

THE Sioux City (Iowa) Service Company has placed in service the fourth rotary snow sweeper built in the company's shops and embodying several unique features designed by C. M. Feist, master mechanic. The first of these machines was built in 1910, another one in 1916 and two in 1917, so that there has been ample opportunity to try them out thoroughly and determine their worth for keeping the right-of-way clear of snow.

The outstanding feature of construction is the design of the brushes. The foundation for the rotary brush at each end comprises three cast-steel spiders mounted on a 2½-in. shaft which is connected by sprocket and chain to a 30-hp. street railway motor mounted on the platform and housed in a box. A sheet of steel extends the entire length of the brush shaft and is wide enough to project beyond the spokes of the three spiders. This sheet is riveted to the spokes and further strengthened along the outer edge by a ¼-in. x 6-in. mild steel plate riveted in place. The broom sections are fastened to the outer edges of the four webs thus formed. The brooms are made of broom corn and are similar to a floor broom without the handles, for they are well sewed and of the same width top and bottom. They are reinforced by a facing of spring steel bristles made of 22-in. lengths of 0.114 x 0.026-in. flat steel, bent in the middle and laced through holes in a stick of hickory. This stick and the broom are fastened between 2½-in. channels with 1½-in. bolts, and the channels are bolted to the spiders with six ⅜-in. bolts.

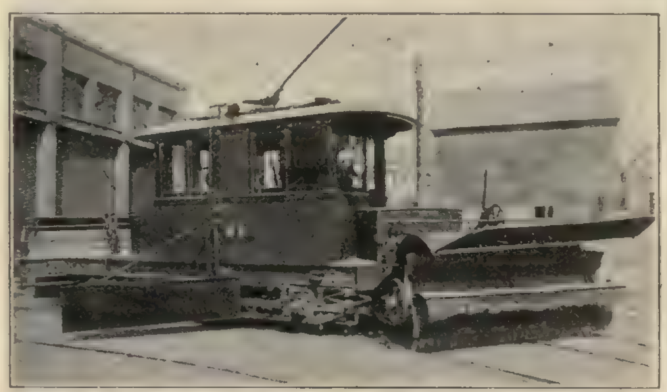
The idea underlying this construction as a substitute for the usual long rattan bristles is that the steel sheets take the strain in handling crusts of snow and also bear the weight of the snow, while the short well-supported broom corn, extending only about 10 in. beyond the spider, sweeps clean and takes care of the variation in paving level. It is claimed that the sweepers of the Sioux City company have been able to handle snow that the ordinary sweeper would not negotiate.



SPECIALLY DESIGNED SIOUX CITY, IOWA, SNOW SWEEPER SHOWING BRUSH CONSTRUCTION

The broom is driven at a speed of 300 r.p.m., and the speed is controlled by means of a controller and grid resistances and also through an adjustable countershaft.

Another interesting feature of these sweepers is that the side wing is carried in a cradle supported by heavy hinges, with an arrangement whereby the forward pull on the outer end is made from the cradle rather than the wing itself, as is usual. The plate forming the wing is so supported in the cradle as to permit it to be bent backward upon striking any obstruction. This flexibility is obtained by the use of heavy springs which bear against the bottom edge of the wing, permitting it to rise to clear an obstacle and automatically to return to position without breaking.



THE SIDE WING IS SO FLEXIBLY SUPPORTED THAT IT WILL NOT BREAK UPON HITTING AN OBSTRUCTION

The Sioux City sweepers are double-ended and the position of the brush at either end, speed of rotation, etc., are entirely controlled from drums and wheels mounted inside the car body. The main frame of the sweepers is made of 12-in. I-beams for the side members with 12-in. channels bolted across the ends by means of gusset plates. All castings used are steel, of special design, from patterns made in the company's own shops.

In addition to being more effective than the ordinary rattan sweeper, Mr. Feist states that it is more economical to maintain these brushes. One filling of these home-made brushes usually lasts through one winter and the replacement expense is less than for rattan brushes.

Transparent Protectors for Passes

RAILROAD passes, building and plant passes, membership cards, truck drivers' licenses, authorizations of various kinds and many other similar articles, which are generally made of paper and have to be shown frequently, become bent, broken, torn and dirty from handling and carrying about in the pocket. They are generally carried in leather or imitation leather cases and the face of the pass is shown through a transparent cover.

An ingenious substitute for the more or less cumbersome leather case is made by cementing the card between two pieces of transparent sheeting. This can best be done by spraying the pieces of sheeting with a solution of one-third wood alcohol and two-thirds amylacetate, and, after allowing them to dry for about ten minutes to avoid blurring the ink, placing the card between them and uniting them by hydraulic pressure. Satisfactory results can usually be obtained in a somewhat simpler manner by coating the card on both sides with a pyroxylin solution, using a camel's hair brush.

F. A. E. S. President Speaks in Chicago

Herbert Hoover Urges Engineers to Get Behind Federation Movement for Active Part in Great Political and Economic Questions

UNDER the auspices of the general committee of technical societies of Chicago a small group of engineers gathered for dinner at the Engineers' Club Dec. 10 to take advantage of Herbert Hoover's presence in the city and hear what he might have on his mind as the newly elected president of American Engineering Council, through which the Federated American Engineering Societies acts. W. L. Abbott, Commonwealth Edison Company, presided at the meeting. After Mr. Hoover had spoken of the federated movement of the engineers he responded very generously to questions asked him on various world situations, to the great interest and enlightenment of the seventy-five engineers present.

Mr. Hoover said that he had been led to accept the presidency of American Engineering Council because of the opportunity it afforded for great and good influence in coping with the growth of great national associations which is tending toward a division of the population into great economic groups. All of these associations are inspired by a selfish motive and seek to dominate the action of legislative bodies through a "terrorism little less than sovietism," or at the very best are attempting to bring pressure on government. He said that if this selfish purpose is allowed to continue on the part of these numerous associations it would lead to destruction and that we have come to a parting of the ways. In this situation the engineers hold a unique position, for in their great organization there is nothing they could not ask for that would not at the same time be as good for all the population as it would be for the engineers.

Referring to the members of Congress, Mr. Hoover said they have shown a great appreciation of the engineers who have been sent to them to testify before legislative committees by Engineering Council and that they have been glad to find some one upon whom they could depend for exact information not colored by a selfish interest.

Mr. Hoover laid emphasis upon the point that if we are to have the influence in public life of the disinterestedness, detachment and adherence to scientific facts embodied in the engineers, and to keep apart from the influence of the numerous selfish bodies, we must have an organization to do it—some definite engine to perform this work.

As president of the Institute of Mining and Metallurgical Engineers Mr. Hoover said that he had opposed the participation of this association in public matters, and had felt very strongly that it should keep to its function of developing the technical and ethical aspects of the profession. At the same time he has strongly favored going into the Federated Societies in order to provide an influential organization of engineers which would be so constituted as to be able to enter into the great problems facing the public and have this as its primary object. He considered that the movement applied as well to state and municipal affairs as to national matters.

He urged that the matter of the detail laws governing the internal workings of the federation were immaterial and that these could be drawn up or rearranged to meet all requirements. He considered that it was very material that the association be of engineers, that the organization be so constituted that it will sense the sentiment of the engineers of the country before committing them to policies, and that the big thing now is to get behind the movement and lend immediate support so that the work of the federation may be effective during the next twelve months in the solution of the tremendous problems which we now face.

During the course of his speech Mr. Hoover referred to the public regulation of public utilities and other natural monopolies. He said that by taking away rate control the initiative for expansion of facilities to keep pace with the demand for service was also largely taken away. He said that we have yet to devise laws that will protect the public from natural monopoly and at the same time keep this initiative. Under the present system no financial group is ready to take the responsibility of financing the necessary expansion of these monopolistic businesses. He did not want to see government ownership. While this matter of regulation is one of the great problems which the people must solve, he said that "no one in Washington has held his head in his hands ten minutes trying to solve it." On the contrary, the primary effort has been to coin phrases that would get into the headlines and pull votes.

CONFIDENT A BETTER LABOR SITUATION IS POSSIBLE

Mr. Hoover also made a very interesting brief analysis of the labor problem. He said that at present organized labor is between two fires. There is the radical element on one side, demanding the one big union idea, with the object of dictating to government and the ultimate socialization of industries. But labor realizes that this cannot be attained as long as craftsmanship is the basis of the organizations. In other words, it will be necessary to destroy the present structure of the labor organizations before it is possible to bring about any radical change in structure.

On the other side there is capital, which is being counseled in many quarters to take advantage of the present favorable situation to crush out organized labor altogether. Between these two forces Mr. Hoover said that the craft basis of organization may be crushed out, and he thought it was worth while to consider the advisability of supporting this form of organization. He contended that labor will be organized in some manner, regardless of any effort to suppress it.

He said that labor is now earnestly groping for some method of alteration of the whole economic operation of its organizations, to get away from the principle of limited production. It is now seriously proposed that every effort be put toward the problem of how we can get maximum production within reasonable physical limitations. He said that while some people would claim that this attitude of labor was insincere, he believed it was honest and considered it the greatest mental revolution we have ever seen. Mr. Hoover pointed out that the great underlying objection to the closed shop is that it has always meant less production, and he thought that if this could be changed there would be little well-founded objection to the real purposes of organized labor. He contended that if organized labor could be brought into co-operation with organized employers we would see a tremendous advancement in industrial conditions, and he thought that the engineers were the best equipped men to give attention to this problem.

Association News

Topics at Chicago

THE printed program of the mid-year conference of the American Electric Railway Association at Chicago, Feb. 10, shows that addresses will be presented on the following topics, all connected with the main subject of electric railway financing:

"Review of previous financial methods":

Summary of the changing methods of financing capital improvements from the days of early electrification down to the present, with reasons therefor; influence of low rates of return on such methods, as disclosed by large proportion of capital securities represented by interest-bearing debt; influence of the holding company and probable future; war-time financing; post-war financial methods.

"Present requirements for mortgage securities":

What competition requires in the way of relation of cash invested to amount of loan; influence of previous history on electric railway investments; margin of earnings over interest charges; flexibility of mortgage provisions; necessity of ample staple earnings as a condition precedent to re-establishment of credit to be derived from automatic regulation or cost-of-service franchises; characteristics of interest-bearing securities which the general market is likely to absorb during the next year or two.

"Necessity for financing by sale of capital shares":

Importance of providing for return on new capital that will invite the investment of new money through the purchase of issues of capital stock; requirements in the way of franchises or methods of regulation which will support such plans of financing.

"Home-town financing—partial mutual ownership":

Desirability of large local interest held by car riders; influence on local regulatory ordinances, etc.; cost of capital procurable by this means; methods of distribution.

"Municipal aid in future financing":

Definition of conditions under which municipal co-operation is required; moral support and abandonment of street railway as political issue; pledge of municipal credit through guarantees; municipal aid for rapid transit in the construction of subways and elevated lines.

"Are financial reorganizations necessary?":

The criteria for determining the particular conditions which will make financial reorganizations of electric railway corporations probably necessary before their credit can be re-established.

Advocates Support of Bureau

CONTINUATION of the investigation of electrolysis by the Bureau of Standards is urged by Charles L. Henry of the American Electric Railway Association in a letter to the chairman of the appropriations committee of the House of Representatives. The letter, in part, is as follows:

The Bureau of Standards advises that the Secretary of Commerce has recommended, in his report to Congress, among other items relating to public utilities, that $25,000 be appropriated and made immediately available for the investigation of electrolysis and that the matter would be presented, if at all, to the House by the legislative, executive and judicial appropriation bill.

On account of the change in the make-up of the appropriations committee, I beg to inquire of you as to what branch or subdivision of that committee this bill would come before and the name of the chairman of the subdivision. All public utilities—those which use electricity, and gas and water companies as well—are very much interested in the question of electrolysis and are watching with great interest the development of the exhaustive examination being given to the question by the Bureau of Standards. These utilities have been and are co-operating with the Bureau of Standards in this work and have a committee advising and acting with the Bureau of Standards, composed of a representative from the national association of each one of the public utilities interested and affected. The American Electric Railway Association has as its representative on that advisory committee Mr. Phillips of Pittsburgh, a splendid engineer and a thoroughly reliable and gentlemanly business man. It is believed by all who have been taking part and assisting in the work that the Bureau of Standards will work out a solution of the problem before it in such a way as will be beneficial to all concerned, with a view to doing, in the best way and with the least expense and burden to the utilities, what is necessary to give full protection against the evil effects of electrolysis.

We feel very anxious that the $25,000 appropriation asked —to be immediately available—should be granted, so that this necessary and desirable work of the Bureau of Standards can go forward.

Letter to the Editors

Earnings for November of P. R. T.

PUBLIC SERVICE RAILWAY
NEWARK, N. J., Dec. 13, 1920.

To the Editors:

I notice in the ELECTRIC RAILWAY JOURNAL of Dec. 11 an article headed "P. R. T. Increase Disappointing. Mr. Mitten Appears to Be Vindicated by First Month's Result Under Commission Ruling."

This heading is somewhat misleading, particularly as the figures are misprinted. It is evident from the table that the actual passenger earnings for November, 1920, were $3,656,587 instead of $3,056,587 as printed. This would give a percentage of increase of 21.08 per cent over the previous year, and under the present depressed condition of the industrial situation in Philadelphia there is no reason to think that the normal increase would be more than 5 per cent, and if that was the case the increase attributable to the higher fare would be 15.3 per cent. It seems to me such an increase is about all that could reasonably be expected for the first month the new rate was in effect under present industrial conditions.

The experience of companies making such increases is that it takes some little time before the full benefit from the increase in rate is received.

P. S. YOUNG, Vice-President.

[NOTE.—The position taken by the P. R. T. as given in the note was that while the actual result of the new schedule closely approximates that estimated under the flat rate of 5 cents per passenger without transfers, the economies expected with the latter fare, as in handling the receipts, were not possible with the fare ordered by the commission. The typographical error to which Mr. Young refers occurs in the total or final figure in the table as printed, a "0" appearing in place of a "6."—EDITORS.]

The latest word from Germany indicates that a number of the smaller electric railway systems there have discontinued operation, and most of the larger systems are showing deficits although the fares have been greatly increased. The most favorable feature is that gasoline is so expensive the railways do not fear competition from motor buses or private automobiles.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Commissionership Still Open

Toledo Anxious to Secure More Applicants for the Position of Street Railway Director

After a cursory examination of the applicants for street railway commissioner under the recently adopted Milner cost-of-service ordinance at Toledo, Ohio, by the street railway board of control at its meeting during the week ended Dec. 11, it was decided by the board that Henry E. Riggs, dean of the civil engineering department of the University of Michigan, should be brought to Toledo to give advice to the board in choosing a man for the place.

Professor Riggs is one of the three men who served on the valuation board which fixed the price of the property of the Toledo Railways & Light Company before the ordinance was drawn by the cost-of-service commission. David Goodwillie, at that time city service director, was chairman of the valuation committee. He is the member of the board who made the recommendation to hire Mr. Riggs for expert advice.

The board also announced that further applications would be sought. Written notices were received from fourteen men and one woman. A number of local men have not made written application. They are known to the board as "receptive candidates."

Many of the applications which have come in have been from out-of-town men. Some of them are from electric railway executives and many have come in accompanied by clippings from the ELECTRIC RAILWAY JOURNAL referring to the local situation.

Mr. Goodwillie, at the meeting of the board with Mayor Cornell Schreiber last Thursday, declared that he had concluded that there were three essential qualifications for the man who should have the position:

1. That he be able to deal intelligently and sympathetically with the public. Many questions on rerouting and remaking schedules and altering service will have to be handled by the commissioner before being submitted to the board of control and the Council.

2. That he have the ability to gain and hold the confidence of the City Council. Most of the questions of service have to be taken up directly with the Council for final approval. The commissioner also may be interrogated frequently by Council as to the financial and operating statistics of the company.

3. That he must be able to deal successfully with the railway operating company, because in many cases the commissioner has to function as a go-between in transactions involving the city and the railway.

The field for applicants is open yet as the board desires to secure additional names to consider before the appointment is made.

No definite action has been taken on the salary of the commissioner. The board members are business men, free to set practically any salary.

It is not thought the separation of the property and the final acceptance of the ordinance will be filed by the Toledo Railways & Light Company and the agreement between the Community Traction Company and the present company executed before the actual expiration date of the ninety-day period allowed in the ordinance.

New Subway Entrance Lights

In New York City the entrances to many of the subway lines of the Brooklyn Rapid Transit Company are in close proximity to those of the Interborough Rapid Transit Company. On that account there has been some confusion among railway patrons not familiar with the routes of the two systems. Attempts to make plain the different systems by day by means of signs and maps placed in conspicuous places at the subway entrances have been fairly successful. In order that there may be no confusion at night the Brooklyn Rapid Transit Company is installing at many of the entrances illuminated destination signs similar to those used at garages in directing the auto driver to the supply of gasoline. On these signs names are so displayed that they can be seen at all times.

NEW ILLUMINATED SIGN AT SUBWAY ENTRANCES

In the accompanying illustration one of these lanterns is shown installed at the entrance to a station. The lantern at the far side of the stairs is of the old type of octagonal shape without any lettering. The new lamps are, perhaps, not quite so ornamental as those first installed, but they convey information as well as give light. Moreover, they cost less than the original lamps.

Mr. Murray on Radials

Author of Recent Report Gives Details of Some of Economies of New Haven Railroad

W. S. Murray, electrical engineer of New York, was questioned at the session of the Ontario Hydro-Radial Commission during the week ended Nov. 27 with respect to the report prepared by him on the subject of radials for Ontario. Mr. Murray declared that hydro-radials were a necessity for the province and should be built at the present time, even if short parallel lines could not be acquired. He stated that the New York, New Haven & Hartford Railroad saved $750,000 a year on coal on the electric division and the same amount on motive power and in overcoming train waste.

C. E. Friend, comptroller of the Canadian National Railways, stated that the Niagara, St. Catharines & Toronto electric line was purchased by the Canadian Northern in 1910. At that time the gross income was $268,173 and the operating expenses $168,173. The Canadian Northern paid $2.214,316 for the road and spent an additional $1,425,000 on it. Mr. Friend stated that the Hydro Commission was to pay $3,544,000 for the road when taken over. The gross income for the first nine months of 1920 was $715,000 and the operating expenses $604,000. The net was $111,000 and the surplus $21,000.

E. P. Coleman, general manager of the Dominion Power & Transmission Company, Hamilton, stated that the revenue last year on the Hamilton-Oakville line was $184,476 and operating expenses $178,729. This did not include taxes and other items. The operating deficit was $986 without depreciation.

The Hamilton-Brantford line, 23.19 miles, was valued at $1,809,600 with equipment. It operated at a surplus if depreciation were ignored. The 7-mile Dundas line showed a deficit of $8,174.

George C. Royce, manager of the Toronto-Suburban Railway, said the cost of 68.5 miles of track was $3,600,000, an average of $53,700 per mile. The line showed deficits of $119,170 in 1918 and $102,407 in 1919. For the first nine months of this year a deficit of $30,000 was shown.

During the sittings of the Ontario Hydro-Radial Commission at Toronto during the week ended Dec. 4 much evidence was given by representatives of steam railways to the effect that the electric radial railway system proposed to be constructed by the Hydro Commission on behalf of Ontario municipalities could not possibly be made to pay unless the lines were assured of local freight traffic.

Plan for Lease at Detroit

City and Railway Officials Seek to Avoid Duplication of Facilities—Important Terms of Lease Outlined

The submission of a leasing proposition to city officials of Detroit, Mich., for approval having been authorized at the meeting of the directors of the Detroit United Railway on Dec. 1, negotiations were started proposing the leasing by the city of all the company's lines within the corporate limits when Elliott G. Stevenson, counsel for the Detroit United Railway, Mayor Couzens and members of the Street Railway Commission met on Dec. 6. The plan suggested provides for the taking over by the city of the lines together with the equipment, the company to receive a 6 per cent return on its investment and the city to have the right to purchase the lines at any time. The negotiations were started at the suggestion of city officials.

THE company's proposed plan provides for a board of arbitration consisting of seven members, two members to be appointed by the city, two by the company, and three more to be selected by the first four members. This board would place a valuation on the property of the company and would be empowered to agree to the terms of the proposed lease. At any time during the life of the agreement, the city could purchase the lines at a price to be determined by the board.

VALUATION MATTER FIRST

The first question to be settled will be the basis of valuation. The value placed upon the property by the Detroit United Railway is understood to be approximately $31,000,000. It is believed by the city officials, however, that the company would consent to $27,500,000 and $33,000,000 as minimum and maximum figures for the arbitrators to consider. No proposal has been made to the city for the separate sale of any of the so-called day-to-day agreement lines. According to the Mayor, the main question to be considered now is the leasing of all lines within the city, with the idea of taking up the proposition to purchase at a later date.

If the city leases the lines the company is willing to give an option for purchase. Under the terms of the proposed option the company would allow deductions from the option figure of money invested by the city for maintenance. Present Detroit United cars and cars of the municipal railway would be operated over the company's lines and all the depreciation of the company's tracks and rolling stock would be taken care of by the city.

CITY'S POWER LIMITED

According to the opinion of the Corporation Counsel, the city is not empowered to take over any of the day-to-day agreement lines which the company has built and pay for them out of the bond issue authorized last April until the city system is in operation. A 60 per cent majority of the voters favoring the proposal would then be required before the lines could be purchased. In the event negotiations on a price failed the Detroit United Railway could not be ousted from the day-to-day lines, since the agreement provides that the city purchase the lines if it contemplates their continued operation. In case the city ousted the Detroit United Railway from the day-to-day streets and requested the company to tear up its tracks, new tracks could not be constructed under a construction program. This procedure would necessitate discontinuing operation over the day-to-day streets.

No attempt has been made by the city to cross existing tracks and the opinion has been expressed that under the existing state legislation the municipal lines have no authority for such crossings, either at intersections of electric or steam lines. If the law regulating the crossing of existing tracks has to be amended by the Legislature before the State Utilities Commission can grant the municipality permission to cross existing tracks, at grades, then the municipal system cannot be completed until this problem has been settled.

After the proposition was presented to the Street Railway Commission, Mr. Stevenson left the meeting. The matter is one that will require lengthy consideration before the question is settled. If the city and the company agree to the terms of the proposed agreement the matter will have to be submitted to the voters at a special election. A three-fifths affirmative vote would be required, according to the charter, to ratify the proposal.

Complying with the Mayor's request the Detroit United Railway on Dec. 9 submitted a memorandum containing a general statement relative to the proposed leasing of the company's lines to the city. In the hurried preparation of the outline the company aimed to make the statement sufficiently complete to enable the commission to determine whether it was worth while to proceed further with the matter.

There is one feature in the memorandum that has not been discussed with the Mayor and the commission, namely, the provision relative to the creation and maintenance of a sinking fund. According to Mr. Stevenson, to outline at this time any satisfactory arrangement with reference to how the situation would be dealt with at the end of a lease, if entered into, would be very difficult and involve more consideration and study than he has been able to give to the matter.

He believes that the lease, if entered into, should contain a provision for a sinking fund that would pay for the property at the end of the lease, entitling the city to a transfer of the title to the property unencumbered at that time and the transfer to the company of the accumulated sinking fund, which would then equal the value of the property fixed under the plan discussed.

The following is a memorandum setting forth in a general way the more important of the terms and conditions upon which the company would be willing to enter into an agreement with the city in respect to the street railway system:

1. A lease to the city for a term of thirty years of the street railway system in the city of Detroit with the inclusions and exclusions substantially as set forth in the schedule to the proposed contract signed March 17, 1919, and submitted at the election on April 7, 1919.
2. The rental under such lease to be 6 per cent per annum on the fair value as of Jan. 1, 1921, of the property above referred to. Payments to be made in equal monthly installments out of the revenue accruing from operations.
3. The city to maintain each class of property up to the standard of the physical condition thereof on Jan. 1, 1921.
4. The fair value to be determined by an impartial and disinterested board of arbitrators of seven members, two to be chosen by the city, two by the company and these four to choose the other three. The basis of determining fair value to be the cost thereof as of Jan. 1, 1915, plus additions thereto since that date. The cost at Jan. 1, 1915, shall be ascertained as to labor, materials, etc., at the average prices prevailing Jan. 1, 1910, to Jan. 1, 1915, and as to additions since Jan. 1, 1915, either at the cost as shown by the books of the company or at the market prices prevailing at the date of expenditures. The existing depreciation would, of course, be determined by the board as an incident to determining the fair value.
5. All taxes to be paid by the city.
6. Insurance in the amount usually carried, to be maintained and paid by the city.
7. An option giving the city the right to purchase at the end of any calendar year at the fair value so determined as of Jan. 1, 1921.
8. In the event of the default of the city in paying the rental, taxes, insurance, or maintaining the property, and such default continuing 90 days after notice, the company to have the right to reenter and to operate the property until the default is made good. The city also to have the right to surrender possession to the company at any time on six months' notice, in which event the company shall operate for the benefit of the leasehold estate during the balance of the term of the lease upon and subject to all the terms and conditions of the lease including the same as to the rate of fare.
9. The right to be given the city to assign or sublet to a responsible corporation with capable and experienced managing officials.
10. A sinking fund of 2 per cent per annum on the fair value to be created by paying into the Sinking Fund Commissioners of the city, out of the revenues of each month, $\frac{1}{12}$ of said 2 per cent. This to be invested by the said Sinking Fund Commissioners in bonds yielding at least 4 per cent. Interest to be added to the fund. This will accumulate sufficient to pay for the property at approximately the end of the term, at which time the sinking fund will be turned over to the company (to the extent of the fair value of the property), and the system and property will belong to the city.
11. The company to have the right to run its interurban, passenger and freight cars substantially as at present, for not less than six nor more than ten years upon substantially the same terms as set forth in the proposed contract of March 17, 1919.
12. Materials, supplies, etc., to be treated as set forth in Paragraph 3 of the proposed contract of March 17, 1919.
13. The rate of fare to be fixed in accordance with Sec. 14 of Chapter XIII of the city charter — the rental being included under subdivision (C) of that section and the sinking fund above mentioned being maintained in lieu of that provided in subdivision (D) of that section, which contemplates a purchase.

Not having come to any definite decision relative to the action to be taken on the leasing proposition submitted by the Detroit United Railway, the Street Railway Commission sent a communication to company's attorney asking that the company name a price at which it would sell approximately 55 miles of its city lines which the city officials maintain are day-to-day lines or lines upon which franchises have expired.

The so-called Fort Street system from Artillery Avenue to Baldwin Avenue and the Woodward Avenue line from the Detroit River to Milwaukee Avenue are the so-called non-franchise lines.

The commission is eager to arrive at an early decision of the matter before it in order to make proper recommendation to the City Council and the people thereon.

It is not thought that the Detroit United Railway will look with favor upon the sale of the lines which the commission named—especially the Fort Street and Woodward Avenue lines. The company does not admit that it is operating on Fort Street without due rights. The claim is made that inasmuch as the city did not take advantage of the Supreme Court decision to order the company off Fort Street but instead ordered it to make improvements and renewals, under existing conditions the decision no longer holds.

Auto Bus Unable to Compete With Pacific Electric

The auto bus has been defeated in its attempt to compete with the Pacific Electric Railway, Los Angeles, Cal., for business between that city and Pasadena and between Los Angeles and Alhambra. On page 684 of the issue of the ELECTRIC RAILWAY JOURNAL of Oct. 2, 1920, were outlined details of the plan of the Pacific Electric Railway to fight the auto bus stage lines that had applied to the California Railroad Commission for rights to operate auto bus lines between Los Angeles and Pasadena and between Los Angeles and Alhambra. The Pacific Electric Railway met this invasion by applying to the commission for permission to withdraw its commutation rates between Los Angeles and Pasadena and between Los Angeles and Alhambra provided the commission granted the bus lines operating rights.

It has now developed that bus line applicants withdrew their requests when it was shown that the commutation rates of the Pacific Electric Railway between Los Angeles and Alhambra were lower than the bus line could afford to meet. The rates offered by the bus line were 17 cents one way and 30 cents round trip, while the one-way fare by interurban is 21 cents and the round-trip rate 36 cents. The commutation fares of the Pacific Electric Railway are from 8 to 16 cents less than the one-way tickets.

Members of the City Commission of Alhambra asked the bus company in entering the field to reduce its fares to meet those of the Pacific Electric lines' commutation fares. The bus company replied that the best it could do would be a straight 15-cent fare each way. In consequence it withdrew its application.

Legislative Gossips Busy

Much Speculation in New York About the New State Administration's Public Utility Program

All sorts of rumors are afloat as to what is to happen to the Public Service Commissions in New York State. Some have it that a single-headed commission is to be created for the entire State; others that the up-state commission is to be organized on the same plan as the Public Service Commission of the First District; others that a single commission of five members is to take over the entire State; and a few express belief that in the final analysis nothing will be done at all.

In some quarters a tendency exists to investigate the personnel, appointment and acts of the members of the Public Service Commission for the Second District. The consensus of opinion seems to be, however, that if any of the appointees of Governor Smith to the up-state district should tender his resignation, it would relieve the incoming administration of much responsibility. Just what legislation will eventually be enacted will be determined when a legislative program is finally settled by the party leaders. On the other hand, the reorganization of the public service commissions may be deferred for another year waiting the opinion of the people on changes in other fundamental laws.

As regards the general traction situation, but more particularly the situation in New York City, Governor-elect Miller at the Saint Regis on Dec. 14 said to the newspaper men:

> I haven't made up my mind on the subject. In fact, I haven't made it up on various problems that will face me after the first of the year.

A question of great importance to the incoming legislature is, "Who will succeed Senator George F. Thompson, frozen out of public life at the recent election, as chairman of the public service committee in the Senate?" Senator Charles J. Hewitt, the next ranking member of the committee, who has specialized on highway legislation the past few years, is slated to be chairman of the Senate finance committee. Senator N. Monroe Marshall graduates from the Senate to the State Treasurership and Senator Clayton R. Lusk is one of the candidates for president pro tem., which by the process of elimination would leave Senator Mortimer Y. Ferris, the sponsor of the Ferris water power constitutional amendment, the logical chairman of this committee, provided he wants it.

However, with only nine Democrats in the Senate in 1921 out of a membership of fifty-one and nearly half of the members new ones, such a reorganization is liable to take place that few of the committees of last year will preserve anything of their identity. This always means a serious set-back in the progress of what might be termed evolutionary legislation; that is legislation which goes over from year to year, finally crystallizing in such shape as it will eventually become law.

In the Assembly, the judiciary committee will no doubt again be presided over by Assemblyman Louis M. Martin, Oneida, who will have with him most of the Republican members of last session unless they receive other committee assignments. He will, however, be without Louis A. Cuvillier, Democrat, New York, defeated, who was one of the chief objectors both in and out of committee to the Jenks measures. It was to the judiciary committee that the Jenks bills, providing for relief to the traction companies, were referred at the last session of the Legislature.

Five Persons Killed in Accident in Kansas City

The second fatal casualty in eighteen months on the system of the Kansas City (Mo.) Railways occurred at 7 p.m. on Dec. 12 when brakes failed to work as a car started down a hill. Examination showed that a ⅞-in. steel bolt connecting the main brake pull rod with the brake cylinder was broken. The absence of this bolt prevented operation of both the air and the hand-brake mechanism. The car had been inspected as usual in the morning and had operated all day. A stop had been made at Thirty-first and Main Streets, the brakes operating; northbound the car was supposed to make a safety stop two blocks further on at Twenty-ninth Street at the top of a long downgrade. The brakes did not work. The car proceeded down an 8 per cent grade five blocks long, left the rails at a curve at Twenty-seventh Street, glanced against another car southbound, then hit a trolley pole and turned on its side wrecked. Five persons were killed and several others, among them the motorman, were injured. The car was of the one-man "safety" type, and to this is attributed the fact that so little damage was done to the car which it struck and to the third car in its path.

Since June 1 the company has carried 190,000,000 pay passengers and about 90,000,000 transfer passengers. The accident on Dec. 12, with five dead, makes a total of six in this period.

Mr. Cameron Acquitted

Bruce Cameron, former superintendent of transportation of the United Railways, St. Louis, Mo., has been acquitted of all charges growing out of the loss more than two years ago of referendum petitions on a city ordinance affecting the United Railways through an order of *nolle prosequi* entered in the Circuit Court of Green County at Springfield, Mo., by Circuit Attorney McDaniel of St. Louis. This action in the case of Mr. Cameron was predicted immediately after Richard McCulloch, president of the company, was acquitted on Sept. 7 of charges of the same general nature. The history of the cases against Mr. McCulloch and Mr. Cameron was reviewed in the ELECTRIC RAILWAY JOURNAL for Sept. 11, page 514, at the time the charges against Mr. McCulloch were dismissed.

Accident on Northern Ohio Line

A head-on collision between a regular passenger train and a freight train occurred at 11:57 a.m. on Dec. 8 on the Akron-Kent-Ravenna Division of the Northern Ohio Traction & Light Company, Akron, Ohio. The accident took place 2½ miles west of Ravenna. Two persons were killed and twenty-two injured.

The freight train, westbound, pulled into the Black Horse Siding to pass the eastbound passenger train. A westbound passenger train attempted to pull in behind the freight to meet the eastbound passenger train at this point also, but the freight had not left enough clearance for it to get in. The motorman on this passenger car whistled for the freight to pull up a little and the latter pulled right out on to the main line, the crew apparently having decided to proceed to Deitrich Siding, less than ½ mile away.

The eastbound passenger train, made up of one of the company's new Peter Witt type cars, was on time. The view between the two sidings is obscured by a curve and the crest of a hill and the passenger and freight came together head on. The motorman of the passenger car was killed, the opposing motorman bruised and burned from the stove, and a trainman deadheading to Akron with his seven-year old son was probably fatally injured and the son killed.

Controversy Over Buses Settled Satisfactorily

An agreement has finally been reached between the Chicago Motor Bus Company and the Lincoln Park Board whereby the inclosed type bus will be permitted to operate on the condition that boulevard pavements will be protected by the redesigning of the bus and a redistribution of the load so that the maximum weight per lineal inch of tire width in contact with the pavement shall not exceed 1,000 lb., and that the maximum weight per square inch of tire in contact with the roadway shall not exceed 210 lb. The Chicago Motor Bus Company operates buses from the downtown loop district north through Lincoln Park on the boulevard system.

For some time now a controversy has existed between the bus company and the Lincoln Park Board over the weight of buses and the compensation for the use of pavement. Several months ago the bus company put in use a new inclosed upper deck bus for handling a larger volume of all-year-round business.

The Park Board objected vigorously because of the weight involved. The new bus is said to weigh 12,500 lb. It seats sixty passengers. The board also raised the objection that the trees along the boulevard would be damaged. The controversy grew and grew until Judge Landis recently made a statement that he would discontinue the operation of the bus line altogether if an agreement could not be reached with the Park Board.

News Notes

To Chicago Via Montreal.—A movement is on foot to arrange for a special car or cars to take the members of the New England Street Railway Club to Chicago via Montreal at the time of the midyear meeting of the American Electric Railway Association on Feb. 10. The plan would be to leave Boston on Feb. 7 at 7 p.m., reaching Chicago on the evening of Feb. 9. This would allow a stopover in Montreal. A. F. Walker, of the sales department of the American Steel & Wire Company, 120 Franklin Street, Boston, has the matter in charge.

Strike in Corpus Christi.—Motormen and conductors of the Corpus Christi (Tex.) Traction Company have gone on strike because the company refused to pay them 65 per cent of actual pay during the time the service is out of commission or hampered by breakdown in the power plant. The company recently broke a connecting rod in the power plant. This hampered service to an extent that cars are not operated at night. The trainmen demanded 65 per cent of regular pay for the time lost on this account. The demand was refused by the company.

Talk of New Grant in Dallas.—Negotiations between the City of Dallas, Tex., and the Dallas Railway looking to the granting of a new franchise embodying new service-at-cost features will be resumed when Mayor Frank W. Wozencraft returns from Mexico City, where he went as a member of the party of Texans to witness the inauguration ceremonies for President Alvaro Obregon. It is regarded as practically assured that these negotiations will result in the drafting of a franchise embodying features suggested recently, and that the franchise will be submitted to the voters of Dallas for their approval at the municipal election to be held in Dallas next Spring.

Station Design Need Not Be Changed.—The Court of Appeals has sustained the contention of the Interborough Rapid Transit Company, New York, that it should not be obliged to reconstruct its stations in Queens so that the Brooklyn Rapid Transit Company can operate over the structures. Under the dual contracts it was provided that extensions in Queens should be built by the Interborough and trackage rights should be granted the Brooklyn Rapid Transit Company. The B. R. T. then designed and constructed cars without clearance sufficient to permit them to pass the station platforms on the I. R. T. lines. Repeated requests were made by the B. R. T. to the Interborough to reconstruct its stations. Finally the matter was taken to the courts.

Municipal Line in Portland.—The Commission of Public Docks has constructed and is the owner of a new railway line operated by the Portland Railway, Light & Power Company, Portland, Ore. The commission's line connects the lines of the Portland Railway, Light & Power Company with Municipal Terminal No. 4. The road consists of 1.1 miles of track with one siding. The Portland Railway will furnish all rolling stock and power and will operate the line at cost for the commission. The commission consists of five members, C. B. Moores, chairman; John H. Brugard, vice-chairman. G. B. Hegardt, chief engineer and chief executive, is in charge of construction and operation.

New Franchise Sought in Hamilton.—The Cincinnati Traction Company acting in behalf of the Ohio Traction Company has applied for approval of a new franchise for operating cars of the Ohio Traction Company in the city of Hamilton. Under the provisions of the ordinance the Cincinnati Traction Company is required to procure the operation of the Cincinnati & Hamilton Traction Company, leased by the Ohio Traction Company, as a part of the railway system of Cincinnati. It is further provided that all receipts of the Cincinnati & Hamilton Traction Company shall be included in the gross receipts, and that all expenses shall be paid out of the receipts. W. C. Culkins, Street Railway Director at Cincinnati, held that if the fare on the Cincinnati & Hamilton Traction Company lines was increased from 5 cents to 8 cents it would benefit the Cincinnati transportation system.

Program of Meeting

Conference on Uniform Vehicle Law

A conference to consider the possibility of uniform traffic legislation for the different states will be held in Washington, D. C., on Jan. 10. This conference is really the outgrowth of the meeting in San Francisco last summer of the International Traffic Officers' Association, at which several drafts of such a law were considered. These were referred to the executive committee of the Traffic Officers' Association, which held a meeting to consider them on Dec. 6-8 in Cleveland. It was at this meeting that the decision to hold the conference in Washington on Jan. 10 was reached. C. M. Talbert, Commissioner of Streets of St. Louis, is acting as chairman in the call for this conference.

Invitations to attend this conference have been extended to various organizations of national scope interested in traffic conditions, among them the American Electric Railway Association, as well as to a number of similar organizations of less than national scope but having a large membership. Suggestions, modifications or criticisms of the proposed laws should be sent to the drafting committee at least five days before the meeting.

Financial and Corporate

$29,845 Deficit in Rochester

City Street Railway Commissioner Suggests One-Man Cars for Six Non-Paying Lines

Operation of the Rochester lines of the New York State Railways in October under the service-at-cost contract resulted in a deficit of $29,845, according to a report filed with Mayor Edgerton and the Common Council of Rochester by Charles R. Barnes, commissioner of railways of that city. Six lines contribute principally to the deficit and in his report Mr. Barnes outlines plans to make them self-supporting by installing one-man cars on the six routes. The statement for October follows:

Railway operating revenues	$410,561
Operating expenses	320,331
Net railway operating revenues	$82,230
Auxiliary operations—deficit	78
Net operating revenues	$82,152
Taxes assignable to operation	23,743
Operating income	$56,408
Non-operating income	746
Gross income	$59,154
Return on investment	89,000
Deficit	$29,845

Mr. Barnes points out that as in the case of the report for September there were no deductions from revenues in the month of October for renewals and depreciation. The cumulative deficit since the inauguration of the service-at-cost contract totals $105,998. Mr. Barnes states that "this deficit has resulted from operation during months which are generally ones of the lowest revenue and maximum operating expenses." Concerning these losses Commissioner Barnes writes:

> In accordance with the terms of the contract such deficits should be charged against the balancing fund, but due to the fact that the 7-cent fare did not take effect until practically the first of September it did not appear proper to charge the August deficit of $71,325 against the fund at this time, and by mutual agreement between the company and the commissioner such deficit has been transferred to an account, subject to future adjustment.

This disposition of the August deficit results in a balance in the balancing fund as of Oct. 31, 1920, of $265,527. The contract provides that when the balancing fund reaches $200,000 the fare increases. When it reaches $400,000 the fare decreases. The fund was started with $300,000.

The number of passengers, including revenue transfer and free passengers, carried during August was 8,946,767; September, 8,194,984; October, 8,191,265.

Cars were operated 703,537 miles within the city in August, 766,585 in September and 780,889 in October.

Operating revenues in August totaled $362,403; September, $408,648, and October, $410,561. The increased revenue in September and October was due to the 7-cent fare. Operating expense in August totaled $293,535; September, $302,285 and October, $328,331.

Mr. Barnes said:

> The small increase in revenues in October was due to sources other than passenger revenue. The increase of $34,796 in operating expenses in October compared with August was largely due to winter operation and to the increased service. In making the comparisons the number of days in the month has been disregarded. Consideration of these would affect the comparative amounts and percentage relative to the month of September.
>
> Accruals are made for renewals and depreciation for the purpose of creating a fund from which the proportion of the cost of reconstruction or renewals chargeable to operation is paid. No such accrual was made in the month of October nor in September. Work of this character was done during the months of August, September and October, a portion of the cost of which will be charged to the accrual made to this fund in the month of August.

Deficit Being Reduced in St. Paul

Reports show that under the 6-cent fare the St. Paul (Minn.) City Railway, included in the system of the Twin City Rapid Transit Company, has improved its service beyond the requirements stated in the ordinance under which the increase from 5 cents to 6 cents was permitted. Between the period July 19-22 and Nov. 15-19 the company has added fifty-one cars to the morning and seventy-two cars to the evening rush service. The ordinance requires fifty-five cars.

Submission by the company of its monthly report for October shows a deficit of $9,080, despite the 6-cent fare. Deficits are decreasing, however, as shown by report of deficit of $34,372 for August and $23,003 for the month of September.

The report for the month of October follows:

Revenue from transportation	$432,413
Other revenue	4,121
Total revenue	$436,535
Way and structures	4,357
Equipment	50,555
Power	47,721
Conducting transportation	156,733
Traffic	3,576
General and miscellaneous	52,919
Transportation for investment (credit)	1,421
Total operating expenses	$353,642
Net operating revenue	82,893
Taxes	39,203
Operating (gross) income	$43,689
Miscellaneous rents	83
Interest on debt	52,483
Miscellaneous debts	203
Total deductions	$52,769
Deficit	$ 9,080

Revenues reported in August were $363,023, and in September $409,065. Operating expenses reported in August were $309,325, and in September $346,143. During this period the company paid $13,000 more for equipment than it reported in August.

Sees No Redress

Corporation Counsel at Seattle Advises City Must Stand by Its Bargain in Purchasing Local Railway

In a recent opinion as to whether the city of Seattle, Wash., can return the railway properties which it is now operating to Stone & Webster and get back the $15,000,000 of bonds issued in payment for the lines, Corporation Counsel Walter F. Meier expressed the judgment that this cannot be done.

Mayor Hugh M. Caldwell asked for the opinion. He advised Mr. Meier that he understood the Harris Trust & Savings Bank, Chicago, had acquired the bonds in return for the release of a mortgage against the railway property. Mayor Caldwell then raised the point whether "the present holders or subsequent purchasers of the bonds can be bona fide purchasers without notice, so as to acquire any greater rights than the persons to whom the bonds were issued." Mr. Meier said:

> In my opinion, if the present holders or subsequent purchasers of the bonds are in fact bona fide purchasers without notice, they may have greater rights than the party to whom the bonds were originally issued.

In the judgment of Mr. Meier, apparently, the recourse left the city would be in the form of a suit against Stone & Webster. He says:

> If facts can be produced that would defeat the bonds in question, had they remained in the hands of the original holder, such facts, while not assertable against a subsequent bona fide purchaser for value and without notice, may be made the basis for an action against the original holder for the recovery of damages, if any, sustained by the city.

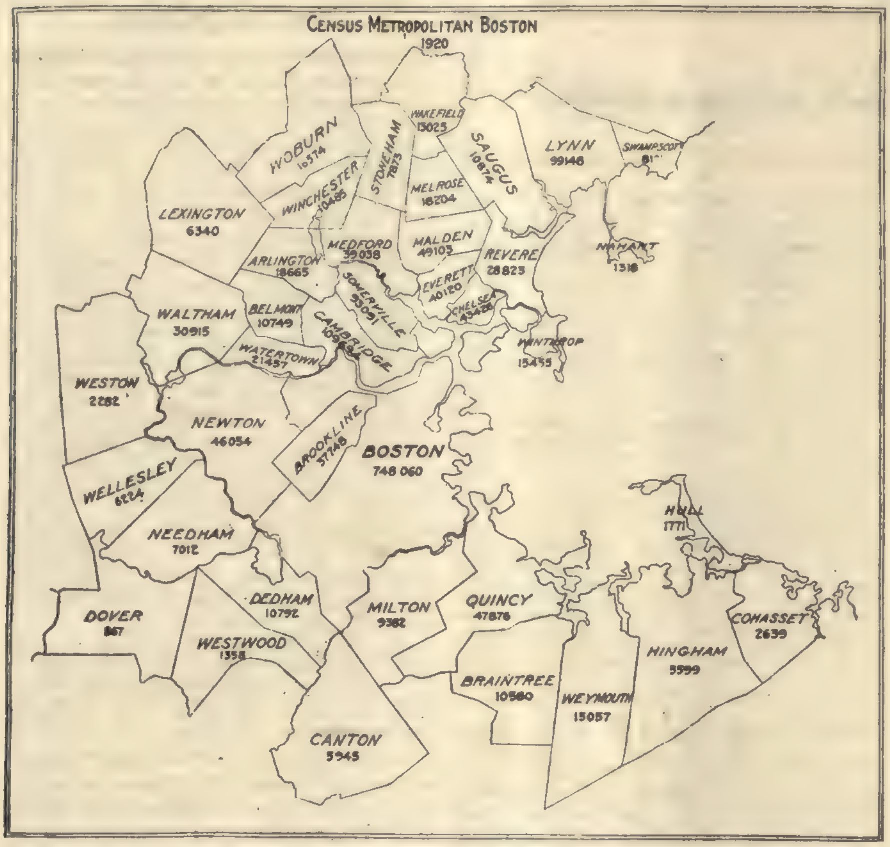
In giving this opinion, Mr. Meier referred to a case at Centralia involving utility bonds which went to the State Supreme Court. The court in this case held "that the same rule or standard which measures the rights and liabilities of individuals should be applied to the business contracts of municipal or public corporations."

The Supreme Court opinion stated:

> When it becomes a question between an innocent purchaser of bonds in the open market and the city purporting to issue them, as to which should be the loser by a breach of duty on the part of the city officers, such question should be solved in favor of the innocent purchasers.

$494,858,000 of Securities in Default

According to the *Wall Street Journal* the aggregate principal amount of public utility company bonds, including gas, electric power and light and traction issues, now in default of interest is $494,858,000. Of this amount issues of traction companies make up the greater part. This authority believes that recent economic developments have turned the tide strongly in favor of utility companies and that from now on all such enterprises should show increased earnings. It says that even though wages do not come down at once, companies are already receiving better service from their employees and can now select better material from those seeking employment.



MAP SHOWING TERRITORY FEEDING BOSTON ELEVATED RAILWAY

Boston Elevated Showing Good

For the month of October, 1920, the Boston (Mass.) Elevated Railway showed a total operating revenue of $2,934,911, but with heavy maintenance expenses the net revenue of $770,736 was $72,731 less than the corresponding month of 1919. The gross income was $704,851 against $771,222 in 1919. After subtracting rentals, interest on funded debt and miscellaneous deductions the net income was only $203,149 and making allowance for dividends of $126,947 the net was $76,201 against $168,097 for the corresponding month of a year ago. In view of the fact that October month is usually a burdensome one owing to heavy maintenance expenses this showing of the Boston Elevated Railway is favorable. The remaining two months of the year will probably make a still better showing. The company's deficit as of Oct. 1, 1920, was $1,022,000, but it is very probable that the early months of the new year will see a decrease in this deficit.

The Boston Elevated serves a total population of 1,192,003, of whom 748,060 are in Boston proper. The extent of metropolitan Boston is indicated in the accompanying census map. While not all this territory is directly served by the lines of the Boston Elevated Railway, the places included in the metropolitan district all contribute to the business done by the Boston Elevated Railway. The population served by the company is shown in the following table of figures from the census of 1920 and that of 1910:

POPULATION SERVED BY BOSTON ELEVATED RAILWAY SYSTEM

	U. S. Census, 1920	U. S. Census, 1910
Chelsea (a)	17,370	12,980
Everett	40,120	33,484
Malden	49,103	44,404
Medford	39,038	23,150
Somerville	93,091	77,236
Arlington	18,665	11,187
Belmont	10,749	5,542
Cambridge	109,694	104,839
Newton (b)	6,908	5,970
Brookline	37,748	27,792
Boston	748,060	670,585
Watertown	21,457	12,875
	1,192,003	1,030,044

(a) Considering that company tracks only serve 40 per cent of population.

(b) Considering that company tracks only serve 15 per cent of population.

INCOME STATEMENT—BOSTON ELEVATED RAILWAY

Month Ended Oct. 31, 1920	Actual October 1920	October 1919	Percentage Change Over
Railway operating revenues:			
Revenue from transportation	$2,895,555	$2,780,502	4.1
Revenue from other railway operation	39,140	39,934	—2.0
Profit and loss — delayed items	215	...	....
Total railway operating revenue	$2,934,911	$2,820,436	4.1
Railway operating expenses:			
Way and structures	236,228	289,471	—1.8
Equipment	235,921	213,755	10.4
Power	350,550	241,743	45.1
Conducting transportation	980,535	889,853	10.2
Traffic	456	......	....
General and miscellaneous	193,482	175,145	10.5
Depreciation	167,000	167,000	....
Total railway operating expenses	$2,164,175	$1,976,969	9.5
Net operating revenue	$770,736	$843,466	— 8.6
Taxes assignable to railway operation	111,783	90,649	23.2
Operating income	$658,952	$752,817	—12.5
Non-operating income	45,898	18,405	149.0
Gross income	$704,851	$771,222	— 8.6
Deductions from gross income:			
Rent for leased roads			
W. E. St. Ry. Co.	$219,690	$212,635	3.3
W. E. St. Ry. Co— Tremont subway	14,694	14,574	0.8
Other roads	2,819	4,875	—158.0
Total rent for leased roads	231,565	232,085	— 0.2
Miscellaneous rents (other subways—tunnels)	143,774	113,220	27.0
Interest on funded debt (B.E.)	107,733	115,103	— 6.4
Interest on unfunded debt (notes)	13,626	19,647	—30.7
Miscellaneous deductions	5,002	6,071	—17.6
Total deductions from gross income	$501,702	$ 486,127	3.2
Net income	$203,149	$285,094	—28.7
Dividends (at 5% on common and 7% on preferred)	126,947	116,997	8.5
Net (allowing for dividends)	$76,201	$168,097	—54.6

Will You Become a Consistent Saver?

In the belief that every wage earner can be made an investor, Henry L. Doherty & Company, New York, will inaugurate a nationwide thrift and investment campaign to test how many people not accustomed to buying securities can be induced to invest in corporate obligations. This widely known banking concern through its extended experience in public utilities and corporate management believes that there are many people who are anxious to save money, but do not know how to convert their savings into investments. The benefits of thrift both to individuals and to nations are appreciated by many, but very few are aware of the high yields on many gilt-edged securities.

In announcing the plan the company says that it will not boast of success, but that the experiment is worth the money and effort spent upon its tryout. The plan will include an extensive advertising campaign to locate first prospects. No appeal will be made for volunteer workers, but volunteer help will be welcomed if offered. W. C. Freeman will engineer the campaign and results of the demonstration will be made public. In conclusion the company says:

> If directly, or by collateral methods, we can make this campaign a success, our greatest desire will be to see a nation-wide thrift and investment campaign inaugurated, a campaign that will be certain to make not merely for better business conditions but for better citizenship and an improved condition for vast numbers of our great population.

Spokane Consolidation Plan Off

All consideration of the consolidation of the local properties of the Washington Water Power Company and the Spokane & Eastern Railway & Power Company, Spokane, Wash., which has been discussed in the interest of efficiency and economy off and on for several years past, is at an end. For several months past committees and engineers representing both companies have gathered data relating to the proposed consolidation. These were in the possession of D. L. Huntington, president of the Washington Water Power Company, on his eastern trip in November. On his return to Spokane recently Mr. Huntington said:

> While in New York and Chicago I had several talks with those interested in the control of the Spokane & Eastern Railway & Power Company. We discussed the question of a consolidation of the railways at considerable length. For various reasons, it is not possible at this time to bring it about.
>
> One of the difficulties confronting the owners of the lines is that the consolidation will involve the expenditure of several hundred thousand dollars. This expenditure would have to be in cash, and no one at the present time wishes to put such large sums into a property which is earning no return on present investment, to say nothing of additional expenditures.
>
> Therefore, it seems that one of the necessary steps to be taken before serious consideration can be given to consolidation will be to place the properties in a condition where they can earn a reasonable return upon the money invested in them and thus justify the expenditure of the further necessary sums that would be called for by consolidation. As every one knows, the cost of money is very high at the present time and it is not forthcoming except to enterprises that can pay liberal returns to attract it.

Hydro Commission Reopens Negotiations for Guelph Radial Railway

Chief Engineer F. A. Gaby and Secretary W. W. Pope of the Hydro Commission met the directors of the Guelph (Ont.) Radial Railway on Dec. 4 and made further overtures for taking over the road.

The commission desires the City Council of Guelph to pass a resolution requesting the Hydro-Electric Power Commission to acquire the Guelph Radial Railway (now owned by the municipality of Guelph) under the agreement already entered into between the hydro and the city. The hydro officials gave the directors to understand that E. C. Drury, the Premier of Ontario, was prepared to have an order-in-council passed covering the proposition.

Under the agreement passed last January the Hydro Commission was to have taken over the Guelph Railway and made it a part of the Hydro-radial system, but Premier Drury objected on the ground that the other municipalities had not been given an opportunity to vote on it, as they were parties to the proposed Ontario Hydro-radial railway system. This resulted in the appointment of the Royal (Sutherland) Commission, which is now investigating the entire Hydro-radial project.

After a long discussion a resolution was passed that the directors were in favor of the City Council passing the resolution submitted by the Hydro-Electric Power Commission provided that the ratepayers of Guelph approve of the same at the next election.

If the ratepayers vote in favor of the proposal, it is expected that the commission will issue $150,000 of bonds to cover the purchase.

The action of the commission in going again to Guelph is generally considered in local circles as indicating the favorable attitude of the Ontario Government toward Hydro-radials.

Financial News Notes

Road Sold for Scrap.—Warwick M. Ogelsby has announced the sale of the Cumberland Railway, Carlisle, Pa., to McGovern & Company, Inc., New York City. The road extends from Carlisle to Newville. This road discontinued operation on Nov. 1. It has previously defaulted in the payment of interest on outstanding bonded indebtedness.

Power Company Takes Over Bluefield Road.—The electric railway in Bluefield and Graham, W. Va., formerly owned and operated by the Appalachian Power Company, has been purchased by the Princeton Power Company, by which operation began on Dec. 1. There will be some rebuilding of track, etc., but the extent of this work had not been determined on Dec. 1.

Extension of Bonds Urged. — The Worcester (Mass.) Consolidated Street Railway, sponsor for the bonds of the Worcester & Clinton Street Railway, amounting to $115,000, has requested the Public Utilities Commission for authority to arrange with owners of the bonds whereby their date of maturity would be extended from January, 1921, to January, 1926. The interest rate would be increased from 5 to 7 per cent.

Twin City Common Dividend.—The Twin City Rapid Transit Company, Minneapolis, Minn., has declared a dividend of $3 a share on the common stock. The dividend is a disbursement out of the current year's earnings. A dividend of $2.50 was paid last February on the common, which it was stated was a disbursement out of 1919 earnings. The regular preferred dividend of 1¾ per cent was declared. Both dividends are payable on Jan. 3.

Franchise Modification Permits Service Resumption.—The Council of Lockport, N. Y., has granted the International Railway, Buffalo, a franchise permitting the resumption of service on Grand and Gooding Streets. Service on these two lines was suspended in August, 1919. Provisions of the franchise, which is effective for ten years, release the company from paying any part of the cost of paving the streets until 1924. Freight cars may be operated on Grand Street on the Olcott division between 11 p.m. and 6 a.m. only.

Arkansas Valley Issue Sold.—A new issue of $600,000 bond secured 8 per cent gold notes of the Arkansas Valley Railway, Light & Power Company, Pueblo, Col., purchased by H. M. Byllesby & Company recently has been practically all sold. The issue was brought out in connection with the recent financing of the Arkansas Valley Company, proceeds of which will provide extensions and improvements to the properties and retire maturing obligations. The notes are dated Nov. 1, 1920, and are due Oct. 1, 1922. They are selling to yield 8.55 per cent.

Intercorporate Affairs a Private Matter.—In a decision handed down by the Superior Court, the Public Service Commission of Pennsylvania has been ordered to refrain from an investigation of the rentals paid by the Philadelphia Rapid Transit Company to the underlying companies. The city and two local business men's associations sought to have the commission investigate, regulate and if possible reduce the rentals of the underlying companies in an effort to clear the transit situation and bring about an equitable rate of fare.

Assessments at Memphis Protested.—The Memphis (Tenn.) Street Railway, through Receivers Elgin and Tutwiler; the Memphis Gas & Electric Company, through Receivers Elgin and Raimer; the Choctaw, Oklahoma & Gulf Railroad and the Memphis Terminal Railroad have filed petitions in the federal court seeking a temporary injunction preventing City Treasurer J. H. Hessen of Memphis from collecting taxes on public utility property at the present assessment. The application will be heard before Federal Judge A. M. J. Cochram, at Maysville, Ky. The appeal of the companies is based specifically on the Fourteenth Amendment to the Constitution. Attorney Miles has delivered a check for $137,750, or about 66 per cent of the total charged against the receivers of the Memphis company.

Service Discontinued By Franklin-Medway Line.—Service between Franklin and Medway, Mass., has been discontinued for an indefinite period by the Milford & Uxbridge Street Railway. The cost of operating this 4-mile stretch of track is prohibitive. Since the beginning of the year the company has paid out $400 a month more than the income to maintain service. The line runs through a hilly and sparsely settled country. For more than a year fourteen round trips were made a day, with an average of eight passengers per trip. Many mill operatives formerly used the line. Now they ride in cars of their own and carry their friends to and from work. Arrangements for increases in fares were considered and one-man cars were operated, but even this was found to be inadequate. Service was discontinued on Nov. 21 last by order of the directors. The Franklin-Medway line is one of the lines of the Medway & Dedham Street Railway. It has been operated by the Milford & Uxbridge Street Railway under lease since October, 1914.

Traffic and Transportation

Further Relief Sought

Washington Railway & Electric Company Asks Straight 8-Cent Fare—Earning Only 4.9 per Cent

A straight fare of 8 cents has been requested by the Washington Railway & Electric Company, Washington, D. C., in a formal petition filed with the Public Utilities Commission of the District of Columbia. The present fare is 8 cents cash with four tokens for 30 cents. In the petition, it is stated that a reduction in traffic would probably follow the proposed increase. The increase of fare early in 1920 is held partly to blame for a decrease of 8.5 per cent in the number of pay passengers, as compared with the similar period of the year preceding. The company asks permission to begin charging the straight 8-cent rate on Jan. 1.

Predicts Decrease in Traffic

The company estimated that a straight 8-cent fare would yield $325,014 additional revenue if there should be no reduction in the volume of traffic. This increase in revenue would enable the company to earn $1,152,808, or 6.8 per cent. The petition refers to a probable falling-off in traffic in 1921 as follows:

> In our judgment, however, we must look forward to further reduction in the volume of traffic. During six months, ending Oct. 31 last, the number of pay passengers carried on our lines was 39,315,085, or 8.5 per cent less than during the same period of the previous year. It is true that this comparison is made with a period at which a lower rate of fare existed than this year. Nevertheless, there can be no question of the fact that the population of Washington has been reduced, and will be, temporarily, at least, further reduced.

The company estimates that a reduction of at least 2 per cent in traffic would follow the new rate of fare. Such a reduction would mean a falling off of $125,808 in revenue in a year, which would reduce the net amount available for return upon fair value to $1,027,000, equal to 6.1 per cent.

To show the burden placed on the company in the paving of the space between tracks, the company sets forth a list of jobs recently ordered or in contemplation by the commission, amounting to $537,784.

Now Earning 4.9 per Cent

An exhibit filed with the application shows that the total revenue from the various lines of the Washington Railway & Electric system for the six months ended Oct. 31 was $3,125,387. Operating expenses, taxes and miscellaneous items amounted to $2,614,897.

This left $510,489 available for return upon investment. Further deductions amounting to $96,592 had to be made recently, however, to cover additional cost of coal and unforeseen maintenance charges, bringing the amount available for return down to $413,897, or 4.9 per cent upon fair value.

The company presents arguments in favor of a 7 or 8 per cent return. On the question of return the petition states:

> It is respectfully submitted that in fixing reasonable rates the money conditions existing at the present time should be considered in connection with the rate of return on the fair value of the properties which said rates will produce, and the commission should take into consideration the indisputable fact that securities free from risk may be bought where the return is 7 per cent or more. The operation of a street railway property is attended with risks that do not attach to such other securities. The greater the risk the greater the return that should be applied. The cost to the petitioner in obtaining necessary capital is a factor which must be considered in the public interest as well as in justice to the company. It is therefore submitted that the rates of fare yielding a return to the petitioner of not less than 8 per cent upon the fair value of the property as found by the commission would be fair and reasonable.
>
> It should likewise not be overlooked, in justice to the company, that during the period from September, 1918, when we first appeared before the commission for an increase in rates, and since which time we have been nearly continuously before the commission, the several rates fixed by the commission have been insufficient in the sum of approximately $1,275,000 of yielding a 5 per cent return upon fair value of the property as fixed by the commission.

Transfer Charge Favored in Indianapolis

Railway Officials and Members of Indiana Commission Consider It Unwise to Change Basic Fare

Hearings of the original and supplementary petition of the Indianapolis (Ind.) Street Railway for a 2-cent transfer charge and for an investigation into the compensation under contracts between the city company and the various interurban lines entering Indianapolis were held before the State Public Service Commission during the week of Nov. 29. Concluding arguments were given on Dec. 6.

UNDER orders of the commission the Indianapolis Street Railway had filed answers to thirteen questions concerning the use of its tracks by the various interurban lines and the compensation received by the company from concessions and rentals in the passenger terminal building in Indianapolis, which revenues the interurban companies claimed were a result of the joint use of the Indianapolis terminals by the various lines. It was shown that actual payments made by the interurban lines during the year 1919 under present contracts amounted to $244,123. The cost of passenger station service furnished at the Traction Terminal Station amounted to $104,841 in the year 1919. The interurban companies paid the city company for passenger station service $53,585. The company received from station privileges, including baggage and parcels check room, $46,782, which the interurban companies claimed was revenue derived indirectly from the use of the station by the interurban cars. Under the figures shown a deficit in 1919 on passenger station service amounted to $4,473. The total number of car miles on the city lines in Indianapolis for the year 1919 was 12,913,940. This comprised 11,895,824 car miles for the city cars and 1,018,116 car miles for the interurban cars.

The city of Indianapolis contends that the interurban lines have been granted increases in fares and that therefore additional track rentals should be paid the city company and that if additional revenue is derived from this source it will be unnecessary to grant a charge for transfers.

The representatives of the interurban lines stated, their contention being sustained by the commission, that there is no partnership between the city company and the interurbans and that there would be no relation whatever between the earnings of the interurban companies per car mile while operating over the tracks of the city company and the amount paid the street railway, and that the Indianapolis Street Railway was entitled only to a fair compensation for the service rendered the interurbans, including a fair return on property investment made on account of the interurbans. A great deal of evidence was introduced by officials of the Indianapolis Street Railway, the Union Traction Company of Indiana, the Indianapolis & Cincinnati Traction Company and the Interstate Public Service Company as to the question of additional maintenance charges which must be borne by the city company as well as increased kilowatt-hour per car in handling interurban cars weighing approximately forty tons, as against city cars weighing approximately twenty tons.

The commission also heard petitions of the Indianapolis & Cincinnati Traction Company and the T. H., I. & E. Traction Company on Dec. 4 for the right to charge a minimum fare of 10 cents within the city limits of Indianapolis. Under the present contracts with the city the interurban companies can charge only a 5-cent fare from the terminal or other points within the city to the city limits. The commission announced that these petitions would be considered in connection with the petitions of the Indianapolis Street Railway for increased rates.

In the closing arguments the Indianapolis Street Railway sought to show that the derived revenue from the proposed 2-cent transfer charge will be approximately $300,000. This sum will be required to offset increased taxes and fuel for power during 1921, and if the anticipated increase in revenue is received it will make the estimated net operating revenue of the company $1,087,000 for the year, applicable to the payment of fixed charges and dividends, which is justified according to the railway by the fact that this amount is approximately 7 per cent on a valuation of $15,000,000, which was suggested by the city as a fair valuation when it proposed that the company should operate on a service-at-cost basis. Since that time the company has added $500,000 in improvements to the value of the system.

IMMEDIATE RELIEF ASKED

The attorney for the city company suggested that the commission permit the railway to put into effect immediately a transfer charge and that the commission appoint some expert to make a survey of the situation relating to proper charges to the interurban companies for track, power and terminal facilities. It was pointed out that such an investigation would probably take six months.

Upon inquiry by the commission as to whether the company would prefer a 6-cent fare to the transfer charge it was stated that the company officials, as well as members of the commission, considered it unwise at this time to increase the basic fare beyond 5 cents.

As a further result of the hearing the Indianapolis Street Railway has requested the State Board of Tax Commissioners to reduce the valuation on its property from the amount of approximately $18,000,000 assessed to a value of approximately $15,000,000, which has been the figure assumed by the city as a fair physical value of the property in its arguments before the Public Service Commission on the fare increase question. The company contends that if such action is not taken by the board the valuation in the hearing before the commission should be raised to equal the tax assessment.

Ten Cents in Each Zone

The Cumberland & Westernport Electric Railway, Cumberland, Md., on Dec. 1 raised its fare in each zone from 7 cents to 10 cents. The increase was made under authority of the State Public Service Commission. The commission directed the railway to sell monthly commutation tickets, good for fifty-six rides, at the rate of 7½ cents a zone. The company must also transport miners, traveling in miners' cars, at the rate of 7 cents a zone, and must sell tickets to clergymen and school children at the rate of fifty tickets for $2.50. In its petition for an increase the management asserted that if a proper allowance for depreciation was made the granting of a 7-cent zone fare would fail to produce a fair return of 8 per cent on the valuation of $1,888,304 for the property.

Eight Cents in Des Moines

Court Directs Increases in Fares and Service—Points Out Fallacy of Proposal for Return to Five-Cent Charge

Judge Martin J. Wade of the federal court entered an order on Dec. 11 putting into effect an 8-cent fare in Des Moines as soon as the Des Moines City Railway puts into operation a 40 per cent increase in service which is ordered in the court's decree fixing the fare. Ten tickets will be sold for 75 cents and five for 38 cents. According to officials of the company it will be at least Dec. 20 before the necessary schedules can be worked out and full arrangements made for operating under the new plan. The court's order follows generally the recommendations made to Judge Wade by the three masters in chancery appointed to investigate the situation in Des Moines, although there are some minor changes such as continuing the present 2½-cent fare to school children and high school pupils.

JUDGE WADE'S order came after a turbulent week in the controversy between the city and the receivers for the railway. Early in the week the City Council had passed an ordinance making it a misdemeanor, subject to $100 fine, for the company to place in effect a fare higher than 5 cents. This is the fare provided in the franchise voted the Des Moines City Railway four years ago.

CITY THREATENS ARRESTS

City attorneys announced that if after Friday morning the company attempted to collect a 6-cent fare, which has been in effect since last August, company officials and trainmen would be arrested as violators of the new ordinance. Judge Wade quashed this plan by means of an injunction issued late Thursday afternoon.

The early part of the week was given over to final hearings by the attorneys for the city and receivers on the recommendations of the masters. Statements by Corporation Counsel Byers that the masters were prejudiced and that the receivers had been partial to the interests of the company called forth a spirited refutation from Judge Wade.

In entering his order Judge Wade said:

> Counsel for the city, with apparent sincerity, urged a return to the 5-cent fare as a means of raising more money, and at the same time urged an enlarged service. The truth is that Des Moines had a 5-cent fare from 1916 until last August, when the new wage scale compelled the receivers to pay out several hundred thousand dollars a year in increased wages. The only solution was to reduce the service.
>
> LABOR COSTS $562,689 MORE
>
> The city in its franchise ordinance fixed a 5-cent fare. This was regarded as binding until the Supreme Court of Iowa held otherwise. When the franchise was granted, wages of men were about 30 cents an hour; now they are 70 cents an hour. There has been added to the cost of operation, since the 5-cent fare was agreed upon as fair and just, for labor alone on the present reduced service $562,689. In other words, the receivers now pay out on the present schedule $562,689 more for labor each year than was paid out the first year of the franchise.
>
> If full service were restored under the present wage scale, the receivers would pay out for wages alone for 1921 $1,021,345 more than was paid out in the first year under the franchise. Still it is urged that return to a fare which the city established in 1916 would pay this $1,021,345 of increased wages. The receivers collect now about 35,000,000 fares a year. To pay the increase in the wages of the men alone, at a 5-cent fare and full service, would require practically 21,000,000 more rides a year.
>
> Increased expenditure for wages is only one item. The fuel cost in 1916 was $77,626. For 1921 it will approximate $218,912—an increase of $151,285. This, added to the wage increase, would require additional fares amounting to $1,172,631, upon normal service. Still many people have been made to believe that a 5-cent fare and full service would produce this money.
>
> These are only two items. Every other element that enters into maintenance and transportation has practically doubled over 1916 and still there are those who talk about a 5-cent fare.
>
> No one disputes that fares in the average city for the past two years have been much higher than the fares in Des Moines. There seems to be some notion abroad that Des Moines is exempt from ordinary economic rules and that in some way public service can be rendered for less in Des Moines than anywhere else.

REFUTES CITY'S ARGUMENT

Judge Wade then gave considerable attention to the financial condition of the company and called attention to the fact that at the time the franchise was voted this condition was known to the citizens of Des Moines. In continuing he said:

> The extra one cent allowed in the 6-cent fare was to pay the increased wages of the men. The representatives of the city of Des Moines have approved and insisted upon payment of every increase of the wages of the men. I thought the 6-cent fare might bring in enough money to pay the current increase, and gradually pay the back pay of the men, but experience has shown that it will not do so. In this emergency, I did not trust to my own judgment as to what should be done.
>
> Three men of high standing have recommended an 8-cent fare. The people of Des Moines are entitled to better service, but some one must pay for it, and there is no mystery about where the money must come from. It must come from the people who use the cars. I have asked for light. I ordered the masters to listen to suggestions from any body of citizens of Des Moines. The only definite suggestion for getting more money is to return to a 5-cent fare with increased service—the absurdity of which is so self-apparent that it is unworthy of discussion.

The decision in the Ottumwa City Railway case referred to by Judge Wade is expected during the present week.

Attorneys for the city have announced that they will appeal Judge Wade's ruling to the Supreme Court of the United States.

Officials of the Des Moines City Railway estimate that the service established by the terms of the order will require 175 additional trainmen, fifty additional shop men, three more trouble men and four more in the wrecking crews. One hundred and thirty-two cars will be put in service during the rush hours as against 103 at present; during the lean hours there will be seventy-eight as against forty-six.

The 6-cent fare was granted last summer to enable the company to meet the demands of its employees for higher wages. The men struck, but returned to work when the new wage scale was made retroactive.

Municipal Railway Considers Increase

Seattle City Lines Will Be $1,610,000 Behind at End of 1921 Under Present Fare—Ordinance for Higher Rate Before Council

At a meeting of the City Council of Seattle, Wash., as a whole on Dec. 2, the emergency ordinance, effective in thirty days, providing for an increase in fares on the Seattle Municipal Railway from 6¼ to 8⅓ cents, or 33⅓ per cent, was passed by a vote of six of the seven Councilmen present. On the following day, however, a majority of the Council attempted to run the blockade with the ordinance with an emergency clause attached, making the measure effective immediately. In this they failed. The ordinance has now been referred back to the city utilities committee where it will stay until some ambitious Councilman again blows the breath of life into its nostrils. In order to pass an emergency measure effective immediately the ordinance must have the votes of seven Councilmen and the approval of the Mayor. Mayor Caldwell had promised to approve the fare increase measure.

UNDER the terms of the ordinance transfer privileges were allowed only through payment of a 10-cent cash fare, the present cash rate, except in cases where the rides originate or terminate on the cable lines, when payment of the 8⅓-cent fare would entitle patrons to a transfer.

RAILWAY $500,000 BEHIND

City officials were extremely anxious to have the order become effective at once, as the railway lines are now $500,000 behind and were to be placed on a warrant basis on Dec. 10. Mayor Caldwell pointed out that "it would be unreasonable to expect the railway employees to discount their wages 10 or 15 per cent in order to receive their pay and that the city could not be said to have done all in its power to fulfill its contract obligations if it left the fare at 6¼ cents." He pointed to the higher rates in other cities.

Mayor Caldwell further said that the railway lines were approximately $500,000 "in the red," and that the city treasurer had co-operated with the city officials to the extent of paying railway bills, although there was insufficient money in the railway fund for this purpose. He relied upon the legislative body, consisting of the Council and the Mayor, to protect him in making these payments. His bondsmen have insisted that further payments be not made in the absence of funds available for the specific purpose, and the lines would have been placed on a warrant basis if the emergency measure increasing fares were not passed.

The petition of a delegation of Seattle ministers asking that the new ordinance include a provision granting Sunday school children the 2½-cent fare the same as public school children was denied by the utilities committee.

FACES $1,610,452 DEFICIT

Estimates prepared show that it will take two years under the new fare to wipe out the present deficit of the railway lines. Estimates of revenues and expenditures of the Municipal Railway for 1921 based on the present 6¼-cent fare indicate there would be a deficit of $1,610,452 in addition to the present deficit of more than $500,000 at the end of the year. On the basis of a fare of 8⅓ cents it was set forth there would be a surplus of $230,844 at the end of a year to apply on the present deficit.

The ordinance provided for three cash fares for a quarter, instead of the present two fares for 15 cents; cash fares for school children, 3 cents; for two, 5 cents; ten tickets for 35 cents. No change was provided in children's fare. Token fares were to be 8⅓ cents, three for 25 cents; six for 50 cents, twelve for $1. It was proposed to charge an additional fare on the Highland Park and Lake Burien line from the city limits to points beyond. Last July the fare was raised from 5 to 6¼ cents.

According to estimates for 1921 the total receipts based on an 8⅓-cent fare would be $7,910,795, with total expenditures of $7,679,951, leaving a surplus of $230,844 at the end of the year. The revenue for 1921 based on the 6¼-cent fare is estimated at $6,069,498, with total expenditures of $7,679,951. This would leave a deficit of $1,610,452. No provision is made in the estimates for any possible reduction in the number of car riders due to proposed increase in fares.

MAYOR FAVORS INCREASE

In discussing the proposed increase Mayor Hugh M. Caldwell stated that in view of the existing and imminent unemployment situation the increasing of fares at the present time was particularly unfortunate and would doubtless work some hardship. He called attention, however, to the fact that the ordinance under which the bonds were issued to pay for the railway obligated the city to charge a sufficient rate to meet the obligations of the principal, interest and operating expenses, if it is possible to do this, at least until matters should be changed by vote of the people or by court proceedings if it should develop that the latter are possible. The Mayor said:

> We have sold and are preparing to sell other utility bonds for the development of the light and power plant, including the Skagit project, and enlarging the water system. I have therefore concluded that it is the duty of the city toward its other utilities to endeavor to live up to the contract under which the public acquired bonds from the city. In other words, any change from that upon which we started or any relief from existing contracts should be had in some other manner than by refusing to charge a rate on the utility that will permit of our keeping our obligations in so far as it is possible for this to be done.
>
> If the charging of an 8⅓-cent fare so decreases the railway traffic as to make the estimates erroneous upon which we are acting, the problem will have to be faced in the light of such developments. If the estimates are correct, it would take us two years in which to wipe out the present deficit.
>
> I have already expressed myself as believing that the theory of this purchase at this price was fundamentally wrong, and that it cannot be entirely carried out on that basis. I still adhere to this view, but it does not relieve us of the necessity or duty of increasing the revenues, at least to the extent provided for in this ordinance.

Mayor Caldwell stated that his proposed investigations of the purchase of the railway lines, for which the Council made an appropriation to cover his expenses, has been delayed by matters "seemingly beyond control," but that he expects to conclude same and make a report on the matter to the Council within thirty days.

Poor Service Chief Ground for Complaint

An analysis of the complaints reported in the annual report of the California Railroad Commission for the fiscal year of 1919-1920, recently issued, shows that poor service by utilities was the source of more dissatisfaction among consumers than were increases in rates. The complaints based on rates aggregated only 487 out of a total of 2,663. The complaints on rates were distributed as follows:

108 against telephone and telegraph companies.
104 against electric light and power companies.
99 against water companies.
12 against gas companies.
38 against auto stage and truck lines.
16 against electric railway lines.
62 against steam railroads.

The complaints on the score of poor service were directed against every class of utility operating within the State, the totals on some of the utilities being as follows:

361 against telephone and telegraph companies.
256 against water companies.
170 against electric light and power companies.
97 against gas companies.
70 against auto stages and truck lines.
49 against steam railroads.
35 against electric railways.

Buses Versus Higher Fare in Flint

Application has been made by the Detroit (Mich.) United Railway to the Common Council of Flint, Mich., for a readjustment of fares in that city. Detailed figures have been presented to the Council showing that if jitney bus competition is to be permitted to continue as in the past a 2-cent increase in fare will be necessary, but that if the jitneys are eliminated the company believes that it will be able to operate, for the present at least, on the basis of a 6-cent cash fare. The fare on the city lines is now 5 cents.

Service in Flint has been operated at a loss for some time past, but it had been hoped that because of the rapid growth of the city and resultant increase in business, it might be possible to continue at the present rate. This hope, however, has not been realized and with the excessive cost of money, material and labor it has been found necessary to ask, temporarily at least, an increase in the rate. The company's investment in Flint is approximately $3,000,000 and a $500,000 extension program is under way.

During the first six months of this year 10,717,163 revenue passengers were carried at a cost of $744,908 or an average cost per passenger of 6.9506 cents. For the month of July, this year, 1,819,442 passengers were carried at a cost of $143,674.56, or 7.8966 cents per passenger. This is 2.9 cents in excess of what the company actually collected from each passenger.

A count recently made shows that Flint jitney buses in one day carried more than 8,000 passengers equivalent to $400 per day or $146,000 per annum taken from the car lines. This jitney service parallels the car tracks and picks up passengers that would otherwise help defray the expense of operation of the railway lines. Statistical data submitted to the Council show that the cost of service rendered in that city every year since 1911 has been greatly in excess of the amount collected from the passengers.

Way Opened for Increase

The Missouri Public Service Commission will in a few days take up the petition of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, for an increase in fare from 7 cents to 10 cents. Consideration of this petition, filed in July as request for a 9-cent fare and later amended to ask for a rate of 10 cents, was interrupted by injunction proceedings, and the resulting order of Federal Judge Arba S. Van Valkenburgh invalidating the commission's method of reaching valuations of public utilities. Judge Van Valkenburgh's decision was reviewed at length in the issue of Nov. 27, page 1122.

Under the decree of Judge Van Valkenburgh it seemed that the commission would be in contempt should it make any modification of its previous rate order without a revaluation of the company's property.

A modification of Judge Van Valkenburgh's decree has cleared the way for immediate action on the St. Joseph petition. Under his new order, the commission is protected in action regarding rates, and at the same time the position of the federal court respecting improper methods of valuation is maintained. His modification of the injunction decree follows:

> It is ordered, adjudged and decreed that the decree for injunction entered in the case of the St. Joseph Railway, Light, Heat and Power Company vs. Public Service Commission of the State of Missouri, et al, on the 13th day of November, 1920, be and the same hereby is so modified as to permit the Public Service Commission to fix interim fares and steam heat rates for said St. Joseph Railway, Light Heat and Power Company upon such valuation as the commission itself may determine to be reasonable and proper. Such fares and rates to be effective during the pendency of an appeal to be prosecuted by said Public Service Commission from said judgment and decision of this court, or until otherwise ordered by the commission prior to the final determination of such appeal.
>
> It is further ordered that any such action of the Public Service Commission shall not be considered to be in violation of the decree and injunction of this court, and that it shall not in any way prejudice the right of said Public Service Commission to prosecute its appeal from such judgment and decree, and shall not prejudice its rights on such appeal.

Christmas Duty in Baltimore—"Save a Life"

"Cutting down the high cost of Christmas" is the target at which is aimed a "No-Accident-Campaign" by the United Railways & Electric Company, Baltimore. In its presentation of the doctrine of safety to its employees and the public the company is directing attention to December's bad reputation in the matter of wasting life, and limb, and time. It ventures the incontrovertible assertion that the cost in fatalities and casualties is far greater than the community should have to pay for its holiday season. In order to reduce this needless waste, therefore, the company calls for the co-operation of its own forces and the people at large in a general safety crusade. Several new ideas are being employed to drive home with extraordinary force the points it is desired to fix indelibly in the minds of those who must apply themselves diligently to the campaign if the wished for results are to be obtained.

One of the pieces of literature that has been distributed to every employee of the company is a card, one side of which bears a December calendar, with the dates printed in very small type in large white spaces. Employees are asked to carry these calendars throughout the month, and to check off their "safe days"—the days in which they are free from accidents. It is believed the moral effect of this idea will be a big force in keeping the men alert to the interests of safety. The same card bears on its reverse side the portrait of a wide-eyed, intelligent little kiddie and a simply worded appeal from him in behalf of all children to the grown-ups to "make it a Merry Christmas; not a sorry Christmas."

Large posters have been placed in all the carhouses directing attention to the "No-Accident-Campaign," and the trainmen are being drilled daily in their responsibilities by representatives of the Safety Department. Car cards and leaflets in racks in the cars urge public co-operation in the campaign.

Trolley News, distributed to the public by the United Railways, has devoted a great deal of space in the current issue to safety. It says:

> But with all the care taken by the company and its employees there remains a responsibility with the public of co-operating in thoughtful endeavors to avoid and avert accidents.

Cities' Power Over Buses

A number of principles to be followed in the regulation of jitneys by municipalities in Massachusetts are laid down in an order issued recently by the State Department of Public Utilities. The department acted on the petitions from the Holyoke Street Railway and the Springfield Street Railway relative to the operation of buses in the town of Chicopee. The petitions asked for amendment or revocation of an ordinance passed some time ago by the Chicopee Board of Aldermen. The department held that the power under which the town authorities acted was very broad, adding:

> We are disinclined to alter or amend rules adopted by the licensing authority of a city that seem on the whole reasonably to insure the safety of the public and to protect the interests of the petitioners.

A majority of the rules laid down by the Board of Aldermen were approved by the department. The bond to be filed by each operator was ordered increased to a minimum of $2,500. The regulations as approved by the department further provide that:

> Motor vehicles shall not stop within fifty feet of the regular stopping places of street railway cars.
>
> No change shall be made by the jitney owners in the rate of charges or in the schedule of operation except after seven days' notice filed with the city clerk.
>
> Every jitney shall come to a full stop immediately before crossing the tracks of any railroad at grade.
>
> Every jitney owner shall report immediately, fully, in writing, to the city treasurer, any injury to a passenger or other person and any accident resulting in substantial damage to property in which any motor vehicle which he is licensed to operate is involved.
>
> The local authorities may suspend or revoke any jitney license for the violation of any state law for the operation of motor vehicles, or violation of the city traffic ordinances or the violation of rules prescribed by the board, or for any other cause deemed by the Aldermen to be sufficient.

May Raise Spokane Fares

The Washington Water Power Company and the Spokane & Eastern Railway & Power Company, operating the two electric railway systems of Spokane, Wash., on Dec. 7 sent to the State Public Service Commission notice of a 25 per cent proposed increase in fares. This will make the rate 8 cents instead of 6 as at present.

The increase is to be effective on Jan. 8, thirty days after its filing. No charge is proposed for transfers nor is the present 4-cent rate for school children to be changed. In connection with this application for increased rates, President D. L. Huntington of the Water Power company said:

> We have tried for months to operate successfully on a 6-cent fare, but we find it impossible to earn a fair return on the money actually invested in the property. Consequently, we have filed the new tariff.
>
> The company has endeavored to keep the public thoroughly posted in regard to the results of operations for many months past by giving each month complete financial and operating statistics to the city authorities and through them to the newspapers.
>
> A study of these statistics will reveal how far the 6-cent fare falls below the cost of operation. Our men have asked for shorter hours, as they are now working longer hours than is common in cities in this part of the United States. To readjust these working hours without increasing the daily pay roll will put a considerable burden upon the operating expenses of the company. This cannot be done under present conditions.
>
> Statistics obtained by us from 505 cities in the United States with an aggregate population of 33,300,000 show that in twenty-four of these cities with a population of 17,658, or 53.8 per cent of the total population, a higher fare than 6 cents is collected.

Early in 1919 the railways in Spokane asked for a 7-cent fare with a charge for transfers. The commission granted an increase of 1 cent, making the rate of 6 cents, with the understanding that if it did not prove sufficient the case could be reopened. Seattle and Tacoma have both since advanced their fares. Spokane is said to have one of the lowest fares in the Northwest.

Discrimination in Fares in Cleveland

The City Council of Cleveland, Ohio, has adopted a resolution authorizing the Cleveland Railway to establish a reduced rate of fare for school children, unless this lower rate imperils the general rate of fare for all car riders.

The directors of the Cleveland Railway are not expected to act favorably on any reduction in rate for school children. This has been presaged in a letter written by John J. Stanley, president of the Cleveland Railway, to Street Railway Commissioner Fielder Sanders, in which he says the plan should be rejected. Mr. Stanley said:

> Service-at-cost rests on one fare alike to all; that fare, the cost of transportation.
>
> The fixing of a rate of fare for a special class at less than the cost of service is a violation of those fundamentals and in conflict with the most important provisions of our Cleveland ordinance.
>
> I cannot believe that Council is ready to change so radically the arrangement under which Cleveland, for nearly eleven years, has enjoyed better transportation at lower rates of fare than any other city in the world.

The City Council now has in its street railroad committee another resolution in which the reduced rate of fare for school children is fixed at 3 cents a ride or forty tickets for a dollar.

New Jersey Increase Suspended

Orders suspending until April 1 next proposed increases in fares on the lines of the Public Service Railway, Newark, N. J., were issued on Dec. 11 by the Board of Public Utility Commissioners. The railway intended that its 10-cent fare should become effective Jan. 1. Accompanying the suspensions were announcements of public hearings to inquire into the reasonableness of the proposed rates. These hearings will be held by the board at its office in Newark beginning Jan. 13.

Transportation News Notes

Eight Cents Asked in Asheville.—The Asheville Power & Light Company, Asheville, N. C., has filed with the State Corporation Commission an application for authority to raise its cash fare on its Asheville city lines from 7 cents to 8 cents. The company proposes to sell four tickets for 30 cents. The present rate took effect about a year ago.

Would Charge 8 Cents.—The Trenton, Bristol & Philadelphia Street Railway, Philadelphia, Pa., has filed with the State Public Service Commission notice of an advance of fare from 7 to 8 cents, effective Dec. 26, between Morrisville and Torresdale and intermediate stations. Special car rates are also advanced.

Asks Lower School Rates.—Randal J. Condon, superintendent of schools of Cincinnati, Ohio, has started a movement to have the fare for school children using the cars of the Cincinnati Traction Company reduced to 5 cents. Considerable pressure has been brought to bear in Cincinnati to further this plan. The matter was referred to City Solicitor Saul Zielonke, who held that to put the new plan into effect it would be necessary to amend the present franchise of the railway.

Early Commuters Favored. — The Galveston-Houston Electric Railway, Galveston, Tex., has inaugurated an early morning service for the benefit of those persons living along the line who desire to get into the cities of Galveston and Houston in time for early business duties. The first car now leaves Galveston and Houston terminal stations at 5 a.m. instead of at 6 a.m. as formerly. This service will enable persons to reach either city in time for business duties at 7 o'clock.

Seven Cents in Cairo.—The Cairo Railway & Light System, Cairo, Ill., has received permission from the State Public Utilities Commission to charge a 7-cent fare on its Cairo City lines. The company is directed to sell four tickets for 25 cents. The commission has issued an order directing the Springfield Consolidated Railway, Springfield, to install a cash rate of 3 cents for school children and to sell twenty-five school tickets for the sum of 75 cents.

Would Charge Ten Cents.—The Concord Electric Railways, Concord, N. H., has filed with the State Public Service Commission a new schedule of rates under which it proposes to increase the cash fare within the Concord city limits from 6 cents to 10 cents. The company seeks to sell ten-trip tickets, each good for a ride in a single zone, for 80 cents. On the interurban line no change is contemplated in the rate of 2 cents in each zone, but a minimum fare of 10 cents instead of 6 cents is proposed.

Grants Temporary Increase. — The Georgia Railway & Power Company, Atlanta, Ga., has received permission to collect a 7-cent fare on its line in College Park. The railway is required to give a rebate slip good for 2 cents to each person paying the new rate, and to post a bond of $250,000 pending determination by the courts of its right to charge the 7-cent fare. The fare has been 5 cents. Citizens of College Park have brought suit to restrain the company from charging the higher rate on the ground that the franchise granted to the company limits the fare to 5 cents.

Must Obey Road Rules.—Trolley cars in the State of Connecticut must obey the state regulations regarding the rules of the road, according to a recent ruling of Motor Vehicle Commissioner Robbins B. Stoeckel. The point was raised following an accident in which a state policeman was killed recently. The electric car kept on instead of waiting for an automobile to come in from the right. Commissioner Stoeckel will urge the General Assembly at its next sitting in January to make trolley cars conform to the regular highway rules that apply to all classes of motor-driven vehicles.

All Work for Safety.—Steam and electric lines, civic, church and school organizations, business houses and professional men of Indianapolis, Ind., co-operated last week in the observance of "safety week." Every accident, no matter how trivial, was reported to the police stations in order that the cause of each might be recorded. The week's observance began on Monday with the blowing of whistles and the ringing of bells. Speeches were made in the schools and at public meetings daily and the newspapers devoted much space to the publication of news relating to means for the prevention of accidents.

Further Increases in Service Impossible.—The Duluth (Minn.) Street Railway cannot on account of its limited facilities and financial condition grant any further increase in the service which it is now giving during the early morning and late evening hours, Herbert Warren, vice-president and general manager of the company, has announced. Mr. Warren was in conference with J. A. Farrell, city commissioner, on the question of a better service for Duluth. Commissioner Farrell will make his report and recommendations to the City Council at an early date so that final action can be taken by the city.

Transfer Points Increased in Fort Wayne.—The meaning in the phrase "Transfer Corner," which for a third of a century has been used to designate one of the principal corners in Fort Wayne, Ind., was entirely lost recently when the Indiana Service Corporation put into effect new transfer rules which change the transfer point from this corner to different points along the various lines. The change was put into effect for the purpose of relieving the growing congestion at this corner. The change was so radical that there was considerable confusion among passengers who had for many years been transferring from one line to another at this point, but the riders quickly accustomed themselves to the new conditions brought about by the change.

Additional Supervisors in Buffalo.—Herbert G. Tulley, president of the International Railway, Buffalo, N. Y., announces new plans for the supervision of traffic on the company's city lines. A special night superintendent has been placed in charge of traffic Saturday nights. The hours of the traffic supervisors have been rearranged so the largest number of men will be employed in the rush hours. Nine more supervisors will be employed during the evening rush hours than a year ago. Buffalo has an average of five supervisors at a carhouse. With the employment of additional supervisors in the rush hour periods, Mr. Tulley believes traffic can be quickened in the congested districts.

Personal Mention

Publicity Work Started

A. G. Whidden Begins Active Campaign for Arkansas Association—Will Use Space in Daily Newspapers

A. G. Whidden, advertising manager of the Arkansas Light & Power Company and the Pine Bluff Company, Pine Bluff, Ark., has entered actively upon his duties as manager of the Public Relations Section of the Arkansas Utilities Association. This section has been formed to place before the people of Arkansas the truth about the State's public utilities. C. J. Griffith, manager of the Little Rock Railway & Electric Company, is its chairman.

Under the direction of Mr. Whidden a campaign has been started to show the public what the utilities mean in every way. In addition to using space in the daily newspapers of Little Rock, Pine Bluff and other cities, the committee is issuing a series of bulletins and other public utility material. The committee has adopted the policy of using paid space in the newspapers for placing utility information before the public. It is Mr. Whidden's opinion that this is the best method of obtaining the good-will of the newspaper men and of showing them that the committee does not expect them to bear the burden of its campaign.

Mr. Whidden is a native of New Orleans. His experience has been in newspaper work rather than in the utility or steam railroad fields. He entered the newspaper business in Louisiana, where at various times he edited several weekly and afternoon daily papers. He also edited dailies in Arkansas, Texas and Mississippi. His last newspaper work was in Pine Bluff, Ark., where he served at one time or another as advertising manager, business manager and managing editor of the *Morning Graphic*.

During the war Mr. Whidden served with the Army Y. M. C. A., for which he handled the recruiting campaign in Louisiana. He also directed camp publicity work at Camp Pike, Ark., and acted as state publicity director of the United War Work Campaign in Louisiana. He joined the Arkansas Light & Power Company and the Pine Bluff Company as advertising manager in August of this year. He will continue his connection with these companies.

New Post for F. J. Stevens

F. J. Stevens has been appointed master mechanic of the New York & Queens County Railway, the Long Island Electric Railway and the New York & Long Island Traction Company, New York, N. Y. Mr. Stevens was formerly master mechanic of the Atlantic City & Shore Railroad, Atlantic City, N. J. Until about four years ago he was superintendent of equipment of the Fort Wayne & Northern Indiana Traction Company, now the Indiana Service Corporation, Fort Wayne, Ind.

A Christmas Message

"Dan" Fisher of Texas Surprises His Friends Again in His Inimitable Way—Passing Another Milestone

Everybody in Texas and the great Southwest knows Dan Fisher of Dallas—big-hearted bachelor, idolized "big brother" of newsboys, urchins and all kiddies generally, and discriminating connoisseur of oil paintings and good books.

DAN FISHER OF TEXAS

Dan Fisher has been an electrical utility man all his life. He is a past-president of the Southwestern Electrical & Gas Association, probably the biggest sectional utility body in the country. In Dallas they tell this story: One day the president of his company, knowing that Dan had started his career as a railroad stenographer, entered Dan's office and with eyes twinkling said: "Mr. Fisher, all the stenographers are away, but I have a very important letter to dictate. Would you mind taking it?" Then he dictated: "Mr. Daniel G. Fisher, You are hereby appointed assistant general manager of this company, effective at once!"

But after several years of "double-distilled hell" in the operating end, Dan determined to get back into general administrative work, and, besides taking charge of publicity, wisely decided that the only perfect existence is that of an editor. His cheerful magazine, *Texas Utility News*, brings a veritable Gulf breeze and a breath of magnolia into those offices which wait for it each month. Dan is a vice-president of the Association Advertising Clubs of the World and occasionally preaches a lay sermon from the pulpit. The newsboys of Dallas have crowned him king, and 150,000 kiddies attended the Children's Day events which he directed at the Dallas Fair this fall.

Every Christmas time this kindly Texas philosopher sends to those fortunates who are on his mailing list messages of Christmas greeting that are distinctive and full of heart-warming friendliness. This Christmas the message from Dan is in the form of the following verse:

HERE'S A CHEER FER YOU
CHRISTMAS MORNIN'

We're passin' another milestone,
To the rim uv the great divide.
You 'nd me's gettin' closer, ol' pardner,
As the long, hard trail we ride.

Where the hoof prints p'int just one way,
With no returnin' tracks,
Where the herds are driftin' onward,
But none are comin' back.

You an' me hain't nigh so coltish
An' gunhandy 's we uster be
Old age is a creepin' slowly
But shorely 'pon you an me.

My gun hand's gittin' wabbly
An' my temper's coolin' down.
The Prince uv Peace has shorely got me,
Fer I smile instid uv frown.

Here's a cheer fer you Christmas mornin'
An' a hope that the years to come
Deal kindly with you, my good friend,
Till your work in this range is done.

An' when God goes to cuttin' the cattle
May He herd you off to the right,
To a range uv eternal sunshine
In a land where there ain't no night.

Mr. Campbell Returns to York

Gordon Campbell, president of the York (Pa.) Railways, has returned to York and has resumed the active management of that property and of the Edison Light & Power Company, also of that city.

In the summer of 1919 Mr. Campbell was appointed vice-president of the Municipal Service Company, Philadelphia, Pa., which controls a number of traction and lighting companies, including the Citizens' Traction Company, Oil City, Pa., and the Youngstown & Suburban Railway, Youngstown, Ohio.

Mr. Campbell's return to York was made at the earnest solicitation of the board of directors of the York Railways in order that he might devote his entire attention to the local properties. Mr. Campbell became identified with these properties in 1908. Prior to that time he was associated with public utilities in Denver, Col.; Newark, N. J.; Providence, R. I., and Washington, D. C. He has long been active in the work of the associations in the utility fields and served two terms as president of the Pennsylvania Street Railway Association.

Mr. Earlywine Made C. E. R. A. Secretary

L. E. Earlywine, assistant secretary of the Central Electric Railway Association, since June, 1915, was elected secretary of the association at the Indianapolis meeting on Dec. 3. Mr. Earlywine succeeds the late A. L. Neereamer, who died last July.

Mr. Earlywine was born near Georgetown, Ind., on Oct. 13, 1887. Practically all of his business experience has been in the railway field. He began with the Big Four in 1910 as chief clerk to the general foreman of the Indianapolis shops. In 1911 he was made private secretary to the division superintendent of the Cincinnati, Hamilton & Dayton Railroad, and in 1913 took charge of the statistical work of that railroad. He continued as statistician of the company until he resigned to assist Mr. Neereamer with the various work of the C. E. R. A. Mr. Earlywine's election as secretary of the association makes him also secretary of the Central Electric Railway Accountants' Association and chairman of the Central Electric Railway Traffic Association, which are subsidiaries. He will supervise the compilation of joint tariffs, the collection of data, the keeping of the member companies advised of the activities of the state commissions and the Interstate Commerce Commission and the numerous other activities of the association.

L. E. EARLYWINE

O. L. Flowers Steps Up

O. L. Flowers, who held the controller of the first electric car ever run through the streets of Clarksburg, W. Va., has been appointed general inspector of the Fairmont and Clarksburg Divisions of the Monongahela Valley Traction Company, Fairmont. The office is a new one, having been created as a part of the railway's program of promoting the welfare of its patrons. Mr. Flowers will make a general survey of conditions throughout the company's system, with particular reference to seeing that the patrons are accorded courteous treatment. Mr. Flowers has been freight agent of the company for several months. He is succeeded in that position by Foster Ash, who has been his assistant. Mr. Flowers has been in the service of the company for fourteen years, or since it was organized, having started in the service as a motorman.

Electrification Committee Named

A. S. Baldwin Heads Body Which Will Supervise Illinois Central Work—W. M. Vandersluis Engineer

President C. H. Markham of the Illinois Central Railroad has appointed an electrification commission to determine the system and general design and plans for the electrification of the Chicago terminal of that railroad.

The members of this commission are A. S. Baldwin, vice-president and formerly chief engineer of the Illinois Central, chairman; Daniel J. Brumley, chief engineer, Chicago Terminal Commission; Bion J. Arnold, consulting engineer, Chicago; George Gibbs, of Gibbs & Hill, consulting engineers, New York; Cary T. Hutchinson, consulting engineer, New York, and W. M. Vandersluis, signal engineer Illinois Central Railroad. Mr. Vandersluis will serve as engineer-secretary of the commission.

WORK TO START AT ONCE

Messrs. Arnold, Gibbs and Hutchinson have been prominently connected with other electrification projects. Colonel Arnold was a member of the commission which was responsible for the electrification plans of the New York Central terminal in New York City. He has also acted as consulting engineer for the electrification of the Port Huron-Sarnia section of the Grand Trunk, the Erie Railroad at Rochester and the Deadwood-Lead City line of the Burlington Railroad. The firm of which Mr. Gibbs is senior member had charge of the electrification of the Long Island Railroad, the Pennsylvania's suburban service in Philadelphia, and part of the Norfolk & Western work. Mr. Hutchinson planned the electrification of the Cascade Tunnel division of the Great Northern.

The commission is to begin work immediately, it is understood, with the probability that a report will be made within six months. The commission will determine what system of electrification should be used, taking all factors into consideration. After this important preliminary work is completed, it is probable that the commission will be retained as a permanent body to design and superintend the installation of the system adopted. Under the ordinance in which the electrification of the Illinois Central is provided for, the work must begin in 1922. All of the work done by the Illinois Central Railroad in the Chicago terminal area during the last year has been laid out with the future needs of the electrified system in mind. This includes yard layout and the steel cars purchased for present use in suburban service but suitable for later equipment with motors and control.

Present indications are that the suburban service will be handled entirely with multiple-unit cars, and that electric locomotives will come into use only when the electric operation is extended to the through trains.

Promotion for A. K. Plummer

A. K. Plummer is the newly appointed director of traffic of the Los Angeles (Cal.) Railway. Mr. Plummer succeeds F. E. Denison, who has resigned because of ill health. As director of traffic Mr. Plummer will oversee the activities of the traffic supervisors.

A street railway veteran of horse-car days, Mr. Plummer has grown up with the Los Angeles system. Before going to Los Angeles in 1903 he drove a horse-car in San Francisco. For three years he served as a motorman on one of the Los Angeles city lines. He was then promoted to inspector. Three years ago he was again advanced, this time to traveling instructor. He continued in this position until the time of his recent appointment to be director of traffic.

A. K. PLUMMER

Commission Consolidates Steam and Electric Divisions

The Public Service Commission for the Second District of New York has consolidated its divisions covering steam and electric railroads into the Division of Railroads with Charles R. Vanneman, since Oct. 1, 1914, chief of the Division of Steam Railroads, as chief of the Consolidated Divisions and Ray G. Winans, assistant inspector in the Division of Electric Railroads, as chief inspector of electric railroads.

Charles R. Barnes, the chief of the Division of Electric Railroads, resigned recently to become the head of the commission operating the railway in Rochester under a service-at-cost agreement between the city and the New York State Railways. Mr. Winans had been assistant to Mr. Barnes since Jan. 6, 1911.

Mr. Vanneman, the chief of the consolidated divisions, has been with the Public Service Commission, Second District, since March 3, 1910.

Colonel Kealy's Resignation Accepted

Retires as Operating Head of Kansas City Railways, but Will Probably Be Employed by Receivers as Consultant

Col. Philip J. Kealy, president of the Kansas City (Mo.) Railways, will retire from any direct participation in the operation of the property on Jan. 1. His resignation as operating head of the company was tendered the present receivers upon their appointment on Oct. 21. Since that time Colonel Kealy has remained, assisting the receivers in getting started on their new work. The receivers have endeavored to have Colonel Kealy reconsider his resignation and remain with them in the operation of the property. Failing in having Colonel Kealy remain and devote all his time to the operation, there is every likelihood that he will be used in a consultant and advisory capacity as it is his present intention to remain in Kansas City and make it his home.

ALTHOUGH he has resigned as an operating official, Colonel Kealy still remains president of the corporation, which will continue its existence as at present during the receivership. By appointment by the company he is also company member of the Board of Control. The status of the Board of Control is still an open question which will probably be settled soon. Under the franchise there is a member appointed by the city, which position is now filled by Col. E. M. Stayton, and a company member appointed by the company directors. This board has jurisdiction over service, purchases, capital improvements, etc., and in the past has done much of the engineering work for the company organization.

BOARD'S STATUS UNSETTLED

The court, while not ruling definitely upon the board, took the position, when the question was raised upon appointment of the receivers, that there should be no division of authority, and that as far as any authoritative action is concerned the board would be directly under the control of the receivers. Regardless of what will be done with the board, all the present records and system of keeping capital accounts will be continued under the receivership by various departments of the company's organization. The board may still continue technically so that the city's and company's interests may be watched by their representatives during the receivership, and such assistance as may be called for rendered to the receivers.

A sketch of Colonel Kealy appeared in the ELECTRIC RAILWAY JOURNAL, Feb. 12, 1916, page 337, upon his appointment as president. He came to Kansas City as assistant to Bion J. Arnold on the valuation of the property of the Metropolitan Street Railway, taken in 1912 under the direction of the United States Federal Court. Upon its completion he was retained as engineering adviser to Fred J. Harvey and R. J. Dunham, receivers. In the franchise negotiations that followed, he, with L. R. Ash, City Engineer, was author of the Kealy-Ash plan of settlement, which was adopted as a basis for the present franchise. He was named in the new grant as the company's representative on the Board of Control. In February, 1916, he was elected president of the company and company member of the Board of Control, succeeding John M. Egan. Colonel Kealy is first vice-president of the American Electric Railway Association.

Colonel Kealy turns over to the receivers the best operating organization the company ever had in its history, with service at the highest point ever given in Kansas City. Following a strike which began Dec. 11 two years ago, practically all of the company's equipment has been rehabilitated and Colonel Kealy, with his associates, has built up since that time an entirely new operating organization. There is no union at present on the property. All matters affecting the welfare of the employees are settled collectively under the shop committee system. Although no interest has been paid since June, 1919, on the company's bonded indebtedness maintenance work has not been deferred nor has service been allowed to suffer. The receivers, therefore, took over a property in almost perfect operating condition.

COL. P. J. KEALY

The Kansas City Railways, in order to secure fare increases, has had to appear before the commissions in two states, Kansas and Missouri, and has successfully conducted three fare cases before these bodies. Even when a receivership was deemed necessary because of disagreements arising in the bondholders' committee the property was rapidly getting on its feet financially. Despite extraordinary increases in the price of coal in the past six months the six months' operation ending Dec. 31, 1920, will show a net of approximately $500,000 as against one of $90,000 for the six months ended Dec. 31, 1919.

F. G. Buffe, general manager of the company, will be retained by the receivers as general manager for the receivers, in which position he will succeed Colonel Kealy as chief executive officer of the company for the receivers. There will probably be no other important change in the present operating organization.

W. E. Rolston, superintendent of power for the company, has resigned, effective Jan. 1, to enter the employ of the Sioux City (Ia.) Service Company. Mr. Rolston entered the employ of the Kansas City Railways on Nov. 12, 1919. He has been in charge of the extensive reconstruction program at the company's power plant. Mr. Rolston becomes superintendent of power for the Sioux City Service Company.

The department now headed by Mr. Rolston will be combined with the electrical distribution department, and all power matters, both generation and distribution, will be handled directly under the supervision of R. W. Bailey, assistant general manager for the Kansas properties, who has direct jurisdiction over electrical distribution.

RECEIVER PRAISES COLONEL KEALY

"Colonel Kealy has made a splendid record with the property," said Col. F. Fleming, one of the receivers. "He has accomplished much in building the service, and the organization he has developed is strongly loyal to the company. He has accomplished these results under adverse conditions and overcome serious handicaps."

Colonel Fleming spoke with deep appreciation, and even with admiration, of the ability with which Colonel Kealy had developed the equipment, personnel and service of the Kansas City Railways and of his comprehensive and accurate knowledge of the many details of electric railway property, operation and financing.

John E. Kurtz Appointed to Missouri Commission

Governor Gardner of Missouri on Dec. 9, on recommendation of Governor-elect Arthur M. Hyde, appointed John E. Kurtz, Republican, of Kansas City a member of the State Public Service Commission, to fill the vacancy caused by resignation of Judge John Kennish.

When Judge Kennish resigned late in November to become chief counsel for the receivers of the Kansas City Railways he advised Mr. Hyde that he would leave the appointment to him. The Governor said he would appoint any one suggested by Mr. Hyde or would leave the place vacant until the change of administration.

Mr. Kurtz is a lawyer. He will serve under the present appointment until April 15. He will be reappointed by Governor Hyde if he desires to remain on the commission for a full term of six years.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

New Corporation to Broaden Export Field

Potential Capacity of One Billion Dollars Behind Organization to Supply Credit for Foreign Buying

A corporation to be known as the Foreign Trade Financing Corporation will be launched immediately, it is announced, as the result of a conference of representatives of agriculture, finance and business from all parts of the United States called by the president of the American Bankers' Association in Chicago on Dec. 10 and 11. To quote from the resolutions passed at that meeting: "The operation of this organization will result in the broadening of the export market, thus relieving this country of surplus stocks of all kinds, with the result of stabilizing prices and benefiting all lines of trade, agriculture and manufacturing, and will have an especial tendency to encourage production."

A capital of $100,000,000 was authorized, giving a potential capacity of one billion dollars under the Edge act, under which the corporation will be organized. Among the committee of thirty named to supervise the formation of the corporation are found the names of Herbert Hoover and E. M. Herr, president the Westinghouse Electric & Manufacturing Company. It is the intention to get this organization to a functioning point at a very early date, and the entry of such a force in the export finance field should go a long way toward brightening up conditions in all lines of manufacturing.

Easier Market on Cement

Manufacturers' Price Drops Slightly Under Light Demand and Decreased Production

Within the past two months the general slackening of business that has affected many items, combined with the normal seasonal lessening of demand at this time, has served to relieve the previous tight condition of the cement market. In the Oct. 16 issue of the ELECTRIC RAILWAY JOURNAL it was stated that stocks of cement were practically nil, demand far in excess of supply and orders accepted for delivery not much before Dec. 1.

Since that time conditions have changed, as at present the volume of new orders coming to virtually all manufacturers can be said to be very low. Electric traction companies are giving no indication that construction programs next spring will call for any large ordering of cement on their part. Nevertheless producers remain optimistic as to prospects for general demand for their product coming back strong in 1921.

Manufacturers' stocks, on the whole, are still either at a low level or depleted, but in spite of the fact that production is being materially curtailed at present supplies are expected to build up in good shape during the present winter. Deliveries are now made in good time, in some instances from stock and in others within a few days. Cancellations, except where standing orders for shipment of a certain number of barrels per week have been cut, have apparently not been received in large volume; rather the new orders have ceased coming in. Prices within the last two weeks have eased off slightly. Manufacturers generally reduced the price 20 cents per barrel, while the cut with dealers has been even larger, as cement is now quoted at $4.80 per barrel, delivered in truck lots at New York, compared with $5.10 recently.

Quiet Market for Special Trackwork

Prospects for 1921 Business Uncertain, with Electric Railways Displaying Little Interest—Brisk Inquiries from Steam Roads, but Producers Are Keeping Rail Stocks at Low Level

Although a good volume of rail orders for 1921 is being received at present, the market for special trackwork, on the other hand, remains even quieter than is usual at this period. Producers generally are conservative in expressing an opinion regarding prospects for next year's business in frogs, switches, crossings and the more complicated layouts. Steam railroads are entering the market for this material and the number of inquiries reported from that source indicates a good volume of orders through next year. On the other hand, electric traction companies as yet have displayed little or no interest in covering their requirements and the orders placed in that quarter are not expected to be extra heavy.

One of the large makers of special trackwork still has orders on the books from both steam and electric lines sufficient to carry through the winter season. This condition is not general, however, as the fall season just passed fell considerably below the standard of other years in the amount of track laying that was done. Consequently mills are pretty well caught up on their old orders now and deliveries can be accomplished in good time. Foreign buying is light, though the need for this material abroad is known to be large.

Although some producers who do not roll their own rails, particularly those who specialize on girder-rail layouts, are waiting for actual orders before buying rails, this cannot be said to be a general policy. In spite of the fact that a leading maker of this class reports having covered his full rail requirements for 1921 many of the other mills that do not do their own rolling are endeavoring to keep rail stocks as low as possible. These efforts are meeting with success as the result of hand-to-mouth buying. Consequently, it is pointed out, traction companies that place late orders for spring delivery may very possibly run up against long shipments, especially on girder-rail trackwork. This is not only because girder rail stocks are small but the mills rolling this type will not roll for the small tonnages that are often placed under the many different existing specifications. To overcome this factor of orders being held up until a sufficient tonnage of each specification accumulates to make it worth while for mills to roll, traction companies, it is stated, are more and more standardizing on the A.E.R.A. standard rail.

Production conditions with respect to raw material, labor and transportation are fairly favorable and continue to improve. Prices hold steady and the consensus of opinion is that no reduction on special trackwork may be expected until labor costs have undergone a material downward revision.

Twenty American Street Cars for Finland

Helsingfors, Finland, has received twenty American street cars which were ordered by the local tramways company for service in the city there, according to Consul Leslie A. Davis. It is expected, he says, that the sale of these cars in Finland will lead to further sales, not only in that country but also in Norway, Sweden, Denmark and other countries of northern Europe.

There is a demand there also for street-car rails, maintenance equipment, machinery for repair shops, snow plows and sweepers, street sprinklers, steel-wire brooms with ice chisel on end of handle and similar articles. Owing, however, to the present unfavorable rate of exchange there would probably be difficulty in obtaining the necessary currency license for their importation at this time.

Senate Committee Recommends Regulation of Coal Industry

Repudiation of Coal Contracts, High Prices and Irregularities of Deliveries Sharply Criticised in Report Made Before United States Senate This Week

A severe arraignment of the coal industry was made before the United States Senate this week in a preliminary report of the Senate committee on production and reconstruction, headed by Senator Calder of New York. This committee, which has been investigating the coal situation for some time, recommends regulation of the coal industry to cure existing evils. The repudiation of coal contracts, high prices and irregularity of deliveries were sharply criticised.

The text of the coal section of the report is as follows:

"The nation is dependent upon coal as its chief source of heat and power, yet the production and distribution of coal are badly organized and subject to manipulation at the expense of the people.

"Coal profiteering, especially as it has followed the priority orders issued by the Interstate Commerce Commission, has continued unchecked by the Department of Justice and is a national disgrace. Coal speculation has been permitted to monopolize the transportation facilities of the country, retarding necessary construction and increasing the basic cost of manufacture and distribution of commodities in general. It has bled the home owners, public utilities, and the industries.

EVILS OF CONTRACT REPUDIATION

"The imperative necessity of continuity of supply of fuel demands the fulfillment of contractual relations in this industry more than in any other, and yet one of the primary causes for the disgraceful and disastrous conditions during the past six months has been the repudiation of contracts. An exceptional demand not only brings about reckless and unwarranted repudiation of contracts made for delivery of coal but the substitution of inferior quality at higher prices. Indeed, coal contracts are so drawn as to be breakable in delivery, in quality and in price.

"Our investigation into the coal situation has convinced us that the private interests now in control of the production and distribution of coal, in spite of efforts by some, are actually unable to prevent a continuance or a repetition of the present deplorable situation, and that it is the duty of the government to take such reasonable and practicable steps as it may to remedy the evil.

"An inherent responsibility of the government is the protection of its people. To assure the mining, transportation and distribution of coal at fair prices is a public duty from which the government cannot escape. But your committee believes that governmental administration of the production and distribution of coal should be a last resort, as governmental activities should always be directed toward encouragement of private initiative and enterprise.

"While the fulfillment of contractual relations is of first importance to the stabilization of the industry in the interest of the consumer, the producer, and labor as well, your committee believes that the government should at all times be informed as to coal distribution and at this time recommends:

"That all coal operators, wholesalers, jobbers and retailers be compelled by statute to file at regular and frequent periods with some federal agency reports on the total tonnage produced or handled, the size and quality thereof, the amount of tonnage contracted for, the amount sold on contract and at spot sale, to whom, together with the prices made or received under such contracts or sales, and producers and distributers to make regular reports sufficient to determine their costs and profits and the corporate inter-relations or the communities of interest, if any, between companies producing and distributing coal.

"With this and collateral information in the hands of federal authorities for possible use by the Department of Justice and other government agencies, prevailing evils as to irregularity in deliveries, inferiority of quality, profiteering in prices and undue monopoly of transportation facilities should to a great extent be eliminated. But if no other remedy can be devised it may be necessary to enact some form of federal licensing to meet the situation.

"Fuel thrift by the small user and fuel thrift by the large user through storage, scientific combustion and transmission should be strongly encouraged by the federal government."

Armature and Field-Coil Market Firm

Large Roads Buying Pretty Well on Shipping Schedules of One Month —Armatures Two Months

Buying of armature and field coils is progressing at a rate only sufficient to cover expected demands for the near future. Shipments from the winding mills can be made from one month up, and although many of the larger roads are ordering a good many sets of armature coils for delivery, so many each month for the next few months, the same cannot be said of the smaller lines. If a heavy winter comes on unexpectedly there may be some difficulty in securing delivery of even a small number of coils to take care of the burnouts occasioned by such weather. Repair parts and replacements for safety cars are coming to be virtually stock items, and armature coils, field coils and complete armatures can be had on almost immediate shipment. Complete armatures for cars larger than safety cars are being quoted on sixty-day shipment.

There has been no change in prices of these parts and with labor prices at their present scale manufacturers see no chance for a downward revision in the very near future.

Specifications Out for Fifty Motor Cars for Chicago

The Chicago Surface Lines is sending out specifications for new motor cars of which fifty are to be purchased immediately, together with trucks and other equipment for fifty trailers now under construction in the company's West Side shops. The new cars are to be of the plain arch-roof, double-end type with bulkheads, closed vestibules and pneumatically operated doors. They are to be equipped with four motors with capacity to haul trailers in continuous service all day and through the tunnels involving 9 to 11 per cent grades. The following table gives the general dimensions:

Length of body over corner posts	32 ft. 9 in.
Length of car over bumpers	48 ft. 11 in.
Width over all at drip rails	8 ft. 6 in.
Width over posts at belt rail	8 ft. 3⅞ in.
Height from rail to top of trolley board	11 ft. 7½ in.
Height from rail to first step	15¾ in.
Height from first step to platform floor	13¾ in.
Height from platform floor to car body floor	10 in.
Truck centers	20 ft. 3¾ in.
Wheel base of trucks	4 ft. 11 in.
Diameter of wheels	31 in.
Seating capacity, including five on platforms	49
Estimated weight	46,000 lb.

The bodies are to be of all-steel construction up to the window rail with a wood superstructure. They will be ventilated with draft-type ventilators and a compensating air intake at each end. This will conform to the standard practice now used on Chicago cars except that they will be the first arch-roof cars to be supplied to this system. The seats are to have spring cushions and form-shape backs, weighing approximately 56 lb. per seat. The rails and stanchions are to be of aluminum and aluminum conduit will be used for the heaters and wherever it can be substituted for other metal. The motor circuits and all other wiring will be run in Duraduct or equivalent material. The windows will be fitted with storm sash covering only the lower sash. The window rails are to be made of bronze tubing in sections fitting in between the side posts. This is a weight-saving plan, which also stiffens the car body, that was worked out in connection with the new trailer design described in detail in ELECTRIC RAILWAY JOURNAL for July 17, 1920, page 110.

The car equipment will include automatic couplers, including the air and electrical connections, and K-type control. In addition to the equipment necessary for the motor cars bids will be requested on fifty pairs of trucks for the trailers and for seats, couplers, curtains, door engines, heaters, headlining, etc., for the trailers. The dimensions of the trailers under construction in the company's shops are such as to match up with the new motor cars. These dimensions are the same as listed above for the motor cars except for the following:

Length of bumpers	47 ft.	6 in.
Height from rail to top of trolley board	10 ft.	9¾ in.
Height from rail to well		15¾ in.
Height from well to top of cross-sill		10⅜ in.
Ramp in floor from center well to bolster		5⅜ in.
Truck centers	25 ft.	
Wheel base of trucks	4 ft.	4 in.
Diameter of wheels		22 in.

The best delivery possible is requested on both motor cars and trailer equipment.

Rolling Stock

The New York, New Haven & Hartford Railroad, New Haven, Conn., is in the market for eight multiple-unit control cars and fourteen trailers.

Brockton & Plymouth Street Railway Company, Plymouth, Mass., has placed a contract with the Wason Manufacturing Co. for one safety car at a cost of $7,550.

Franchises

Wheeling (W. Va.) Traction Company.—At a meeting of the Bellaire (Ohio) City Council held on Dec. 3 the Wheeling Traction Company controversy, which has been hanging fire for three years, during which time the company has been operating without a franchise in Bellaire, was brought up again. Council President McFarland was authorized to invite General Manager C. P. Billings, of the traction company, to confer with Council shortly when the franchise matter will be taken up again.

Frontier Electric Railway, Buffalo, N. Y.—The municipal authorities of North Tonawanda, N. Y., are arranging to revise the franchise of the Frontier Electric Railway, Buffalo, to make the provisions of the North Tonawanda franchise, regarding the time of starting and completing the line, conform to similar clauses in the Tonawanda franchise. The changes were requested by the railway. The company desires an extension of time before starting construction of the Buffalo-Niagara Falls electric line, pleading it now would be impossible to finance the project because of the unsettled market in building materials.

Corpus Christi Railway & Light Company, Corpus Christi, Tex.—A controversy seems likely involving the status of the franchise of the Corpus Christi Railway & Light Company. The City Council some time ago granted a special franchise to the company conditioned on the expenditure of $100,000 to $200,000 in improvements and betterments during the six months immediately following May 26, 1920. These improvements have not been made and the general opinion seems to be that the special franchise has automatically ceased. The company, however, asserts that its franchise has not expired and is disposed to resist by legal action any steps looking to declaring the franchise forfeited.

Track and Roadway

Cincinnati & Dayton Traction Company, Hamilton, Ohio.—In order to cooperate with paving improvements which the city authorities will undertake in Hamilton the Cincinnati & Dayton Traction Company will move the tracks on Mt. Pleasant from the side of the roadway to the center.

Hydro-Electric Power Commission, Ontario, Canada—The Hydro-Electric Power Commission of Ontario is preparing reports and estimates regarding the cost of an electric railway from St. Thomas to Simcoe.

Hydro-Electric Power Commission, Ontario, Canada.—The railway committee of the Hamilton (Ont.) City Council has indorsed the suggestion of Engineer Agate of the Hydro Commission requesting the Grand Trunk Railway to construct the supports of four bridges which would conserve the right-of-way along the Grand Trunk Railway through Hamilton for proposed radial lines. The committee further authorized the city solicitor to apply to the Dominion Railway Board for an order conserving the right-of-way of the Grand Trunk for the radial trackage. The proposed bridges are to be located at Macnab, John, Catharine and Mary Streets in the city of Hamilton.

International Railway, Buffalo, N. Y.—The International Railway, Buffalo, has made an investigation of the cost of replacing certain tracks of the old Niagara Falls line in the city of North Tonawanda and found it would cost approximately $18,000. The company has informed the municipal authorities that it could not make the improvements at this time as requested by the city.

Power Houses, Shops and Buildings

Austin (Tex.) Street Railway.—The Austin Street Railway will install new machinery and electric generating equipment in its power plant with a view to improving the service maintained in the city of Austin.

Southern Pacific Company, Portland, Ore.—Work has been started on the rebuilding of the Lyric Theater building in Portland as a depot for the electric lines of the Southern Pacific Company. Contractors have sublet the work to local firms and the alteration is under way. The estimated cost of rebuilding is placed at $60,000.

Trade Notes

The National Safety Car and Equipment Company, St. Louis, Mo., announces its removal to the National Building, 200-214 South Theresa Avenue.

The Star Brass Works, 3114-23 Carroll Avenue, Chicago, manufacturer of spray cooling systems, has established a Pacific Coast office in the Rialto Building, San Francisco, Cal., in charge of L. M. Page.

The Illinois Stoker Company, Alton, Ill., announces the appointment of the Ernest E. Lee Company, 115 South Dearborn Street, Chicago, as district representative for Iowa, Wisconsin, Michigan, northern Indiana and northern Illinois.

J. W. Murphy, former sales manager of the Esterline Company, has established a manufacturers' agency under the name of the J. W. Murphy Company at 108 South La Salle Street, Chicago. The company will handle Esterline and Duncan meters as well as some other parallel lines.

J. C. Kopf, formerly manager of the engineering department of the Duff Manufacturing Company, has been appointed research engineer and placed in charge of a newly established research department. F. W. Schwerin has been appointed manager of engineering.

The Economy Electric Devices Company, Chicago, Ill., has pending a contract with the Cincinnati (Ohio) Traction Company for the sale of 550 Sangamo Economy watt-hour meters. The traction company has asked the street railway director to approve the contract.

The American Car & Foundry Company's Helmbacher Rolling Mills plant at Madison, Ill., was destroyed by fire on Dec. 15. Officials estimate the damage at $1,000,000. The buildings destroyed were a group constructed of wood and steel, a two-story office building, air reduction plant and thirty-five freight cars.

Bleachery for Insulation Making.—The bleachery which the Irvington Varnish & Insulator Company installed in its Irvington (N. J.) works about a year ago has a capacity of about 1,500,000 sq.yd. of cloth per month. It is equipped with machinery for obtaining the special finishes required on cotton fabric to be used for insulation.

New Advertising Literature

Valves.—The Scott Valve Manufacturing Company, Detroit, Mich., has issued catalog No. 12, containing 185 pages, in which it describes and illustrates its different types of valves.

Safe - Guarding

the Claim Department

Money paid out by the claim department is looked upon by many railway executives as being thrown away simply because it is a preventable expense.

Yet many executives think deeply about this preventable expense when buying new cars or re-equipping old ones.

That is why they invariably insist on Peacock brakes for new or old equipment.

It is also the principal reason why the Peacock is the universal brake.

Type "G" Peacock

NATIONAL BRAKE COMPANY

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Bankers and Engineers

Ford, Bacon & Davis,
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Design and Construct Steam Power Stations, Water Power Developments, Transmission Lines, Substations, Gas Plants.
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Byllesby Engineering & Management Corporation
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New York Tacoma

ROBERT M. FEUSTEL
CONSULTING ENGINEER
Rate, Traffic and Reorganization Investigations
Fort Wayne, Indiana

REPUBLIC ENGINEERS, INC.
CONSULTING AND CONSTRUCTING ENGINEERS
Valuations Reports Investigations
Designs Construction Management
60 BROADWAY, NEW YORK
CLEVELAND, OHIO Illuminating Bldg. YOUNGSTOWN, OHIO Mahoning Bank Bldg.

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

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Company
McCormick Building
Chicago, Ill.

GRIFFIN F. C. S. WHEELS

For Street and Interurban Railways

All of our plants have adequate facilities for fitting wheels to axles

FOUNDRIES:

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Keep your Eye on the
SEARCHLIGHT SECTION
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Scofield Engineering Co.
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Consulting Engineers
PHILADELPHIA, PA.
Gas Works
Electric Railways

THE P. EDWARD WISH SERVICE
DETECTIVES
Street Railway Inspection

50 Church St.
NEW YORK

131 State St.
BOSTON

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and
Mechanical Testing
80th Street and East End Ave., New York, N. Y.

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

WALTER JACKSON
Consultant
FARES, BUSES, MOTOR TRUCKS
More revenue from *more* riders
143 Crary Ave., Mt. Vernon, N. Y.

WE BUILD TRACKS
Construction—Maintenance—Rehabilitation
ENGEL & HEVENOR
Track Engineers—Contractors
220 Broadway, New York City

A. L. DRUM & COMPANY
CONSULTING AND CONSTRUCTING ENGINEERS
VALUATIONS AND FINANCIAL REPORTS
CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS
76 West Monroe St. CHICAGO, ILL.

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and
Reports to Bankers and Investors
Security Building, St. Louis, Mo.

Collier Service

How the Experience of Collier Service Maintains Faith in Car Card Advertising

Your experience in transportation has taught you how to adjust your service—which is your selling appeal—to the habits of your patrons. Otherwise your investors would have nothing to show for their investment.

Experience is just as vital a factor in advertising, not simply in advertising as a whole but in such a highly specialized field as car cards.

For instance, only the nation-wide, generation-long experience of Collier Service assures the car card advertiser of the highest percentage of messages that will be *read*, APPROVED and FOLLOWED because Collier Service has developed precisely the right kind of appeal that can be put into the few words and the simple picture most practicable on a standard size car card.

It follows that if the user of Collier Service had failed to receive satisfactory results, car card advertising would never have become a *stable* source of electric railway income.

Barron G. Collier
INCORPORATED

Candler Building, New York

The Toonerville Trolley That Meets All the Trains. —By Fontaine Fox.

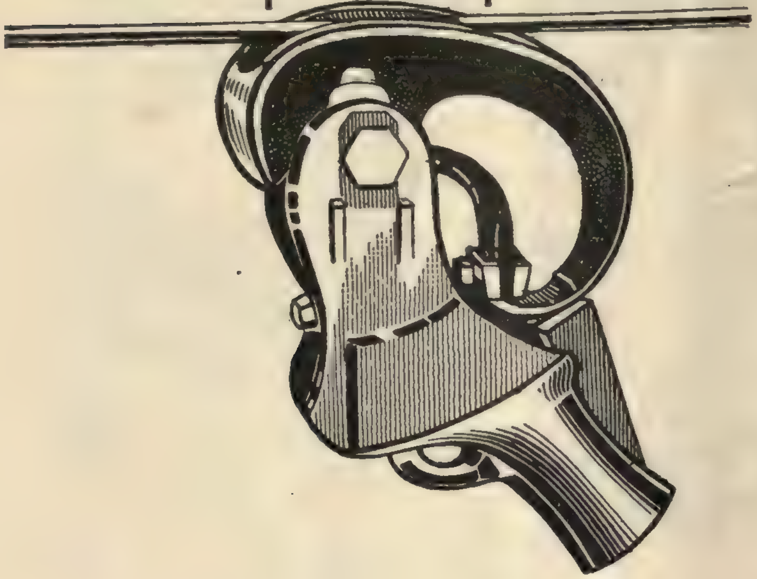
"JEST AS I THOT! A COUPLA BIG WEEDS IS GOT TANGLED IN THEM RUNNIN' GEARS!
THE PECULIAR CONSTRUCTION OF THE TOONERVILLE CAR MAKES IT SUBJECT TO FREQUENT TIE-UPS OF THIS SORT WHENEVER THE SKIPPER LETS THE VEGETATION BETWEEN THE RAILS GROW ABOVE A CERTAIN HEIGHT.
F. FOX
8

Copyright, 1920, by Fontaine Fox.)

THE Peculiar Construction of Chillingworth One-Piece Seamless Drawn Steel Gear Cases reduces *the high cost of gear maintenance*. Operating cars without Gear Cases is expensive. Order your requirements now and *avoid tie-ups*.

The Chillingworth Manufacturing Company
West Side Avenue, Jersey City, N. J.
Sales Office: Thayer & Company, 111 Broadway, N.Y.C.

←3"→ CONTACT



IN all current collecting devices the more contact you have the less friction exists owing to the tension being distributed over a greater surface.

Miller Trolley Shoe operation proves that the greater the contact surface more power is delivered to the motors, giving greater capacity for overloads.

The Miller Trolley Shoe

has a contact on the wire of 3 inches. This contact is permanent. The Shoe follows each little unevenness in the wire. It does not jump and eliminates all sparking.

Miller Trolley Shoes have solved many problems that were the outcome of low voltage.

We stand ready at all times to show you on your own lines just what an advantage can be obtained by equipping your cars with the Miller Trolley Shoe.

Write Today for Details

Miller Trolley Shoe Co., West Newton, Mass.

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Denver, Colo.

S. I. Wailes
Los Angeles, Calif.

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BOUND BROOK BUSHINGS

for the Safety Car—

The Safety Car saves time and labor in maintaining service. Bound Brook Oil-less Trolley Wheel Bushings save time and labor in maintaining the car in service.

They have a self-contained lubricant that never gives out.

Regardless of speed, regardless of attention, they are always lubricated.

On those Safeties, the elimination of loose chattering trolley wheels, the attainment of perfect transmission and the reduction of burnt shunts and other harp troubles means safety and security.

Save time—save man power—insure perfect running, long wearing trolley wheels with Bound Brook Graphite and Bronze Oil-less Bushings.

BOUND BROOK OIL-LESS BEARING CO.

"Specialists in the manufacture of Oil-less Bushings for more than a third of a century."

Bound Brook, New Jersey

Detroit Office: 1723 Ford Bldg.

For Turbine Lubrication

Good Oil is a Most Important Factor

A constant stream of clean, cooling oil must be supplied to the bearings at all times. ¶The oil must not emulsify nor form deposit of any kind and must free itself from any moisture entering the system. ¶It must also maintain a uniform quality over long periods of time.

TEXACO REGAL OIL

A special product for a special purpose which meets perfectly turbine conditions

TEXACO REG.U.S.PAT.OFF

TEXACO REGAL OIL is only one of the many Texaco Lubricants made for special purposes.

There is a Texaco Lubricant for every mechanical appliance in the shop as well as in the power plant.

Consultation with Texaco Lubrication Engineers regarding any or all of your lubricating requirements is invited.

And don't forget to ask us about Texaco Crater Compound, the Great Gear Lubricant and our Texaco Car Oils.

The Texas Company

Dept. RJ, 17 Battery Pl., N. Y. C.
New York Chicago Houston
Offices in Principal Cities

—a sign of the highest development in the compounding of Babbitts

Here are some of the things that "M-J Armature" stands for. That name on babbitt metal means that it is compounded under both *chemical* and *physical* laboratory supervision, of nothing but pure, *new* metals of the highest quality.

It means the alloy consists of tin, copper, antimony and metallic nickel *and does not contain a trace of lead.* It means that it is strong—tough—durable—able to withstand for longest periods the most severe service known to Electric Railway operation.

These are some of the things "M-J Armature" stands for—and some of the reasons why it has been adopted as standard by so many Electric Railways in this country and abroad.

Write for complete data.

MORE-JONES BRASS & METAL CO.
St. Louis, Missouri

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

S BRAND

"The 'Standard' Brand on your material is an assurance of eventual economy."

S BRAND

STANDARD STEEL WORKS CO.

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MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

Sotha

In order to keep them from going to Sotha (sleep), Turkish students are made to read aloud and to swing their bodies to and fro while reading.

Such gymnastic elocution has been in vogue for some centuries in the schools of the Orient, where the proneness to go to sleep is one of the great barriers to educational progress. The reason for this sleepiness may be vague to the scientists, but it seems only natural, judging from the quality of Oriental dances, that their eyes should need a great deal of rest in between times.

Many Central Station operators are prevented, by Sotha, from discovering the real cause of their brush troubles; they never wake up until a Morganite prescriber calls and stops the trouble. Then they see how sensible it is to apply a specific brush to a specific set of conditions.

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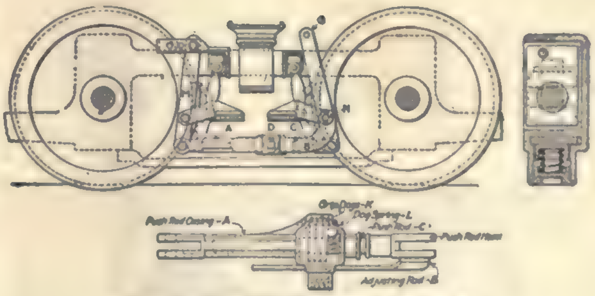

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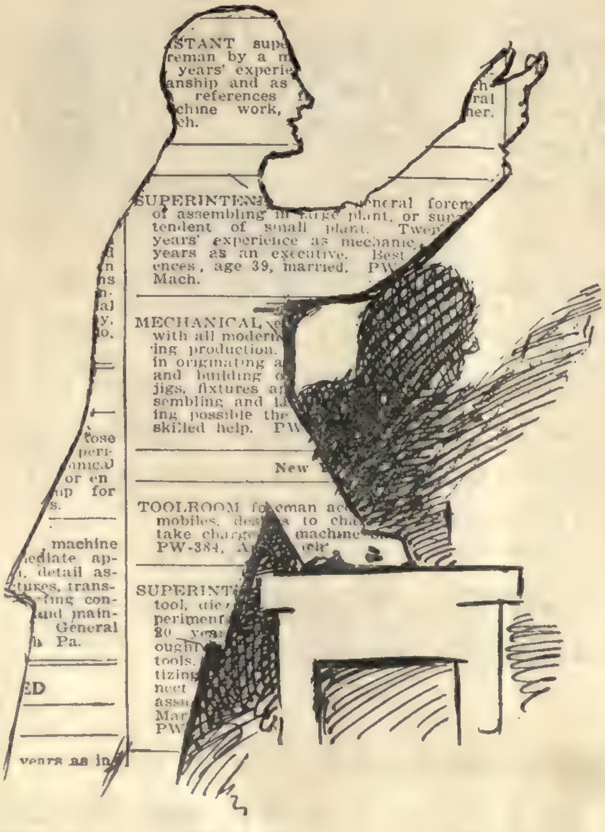

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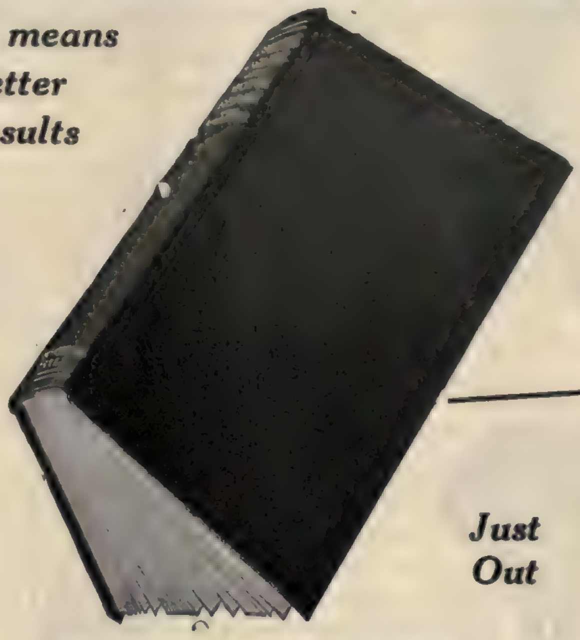

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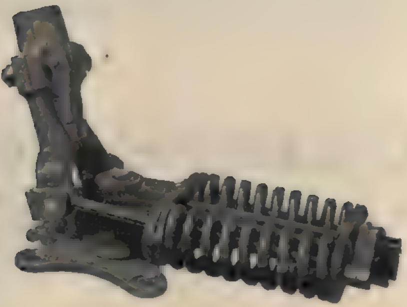

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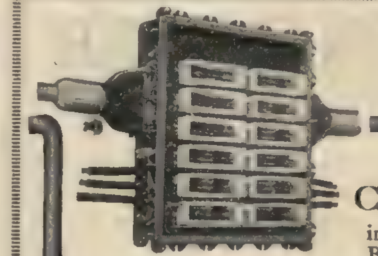

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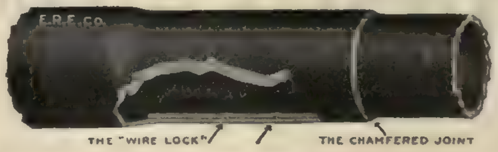

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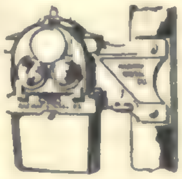

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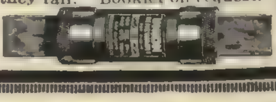

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"Union" Renewable Fuses will save four-fifths of your fuse maintenance cost. Guaranteed to give satisfaction. Money back if they fail. Booklet on request.

CHICAGO FUSE
MFG. CO.
Chicago New York

M-R INSULATION MFG CO

"Everything In Insulation"

Mica
Vulcanized Fibre
Varnished Cloth
Insulating Tapes
Waxes
Asphalts
Compounds
Insulating Varnish

The above are only a few of our products
Write us for anything in this line you may require.
MITCHELL-RAND M'F'G CO.
103 John St., New York City

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.
Second and Diamond Sts., Philadelphia

Electric Insulation

INSULATING VARNISHES
IMPREGNATING COMPOUNDS
PROTECTIVE PAINTS

INSULATION *for apparatus subject to*
Severe vibration,
Oil and moisture,
Acid and alkali fumes,
High external heat,
Dust and grit.

A research laboratory under the direction of competent Chemists and Engineers is maintained by the Company. Any operating condition can be duplicated in the Laboratory and the "guess factor" eliminated.

Information covering varnishes suitable for any service together with most recent methods of application and insulating equipment furnished without fee or obligation.

Send Your Insulating Problems To Us

American Di-Electrics, Ltd.
95 Liberty St., New York

REPRESENTATIVES:
Electrical Engineering & Mfg. Co., Pittsburgh, Pa.
T. C. White Electrical Supply Co., St. Louis, Mo.
James C. Barr, 84 State St., Boston, Mass.
E. A. Thornwell, Atlanta Trust Bldg., Atlanta, Ga.
Albert J. Cox Co., 564 West Monroe St., Chicago
Albert J. Cox Co., Kresge Building, Detroit

Dolph's

DOLPH'S CHINALAK
(Reg. U. S. Patent Office)

For Railway Armature and Field Coils

Chinalak Varnishes both Black and Clear are made with a base of China Wood Oil. This remarkable oil is superior in water-resisting properties to any oil heretofore used in the making of varnishes. CHINALAK varnishes are "long" in oil, giving them the maximum of elasticity yet they may be dried in 6 to 8 hours at 100 to 110° C. The film is tough and pliable, does not become brittle with age and is oil and waterproof.

We have manufactured Insulating Varnishes and Compounds exclusively for the past ten years and our guarantee of quality goes with every shipment.

Send for a working sample of Chinalak, at our our expense.

JOHN C. DOLPH CO.
The Insulation Specialists
Newark, N. J.

Represented by
L. L. Fleig & Co., Chicago and Cleveland.
Baker-Joslyn Co., San Francisco, Los Angeles and Seattle.
Edgar O. Oeters Co., Philadelphia.
Bills and Beach, Oliver Bldg., Pittsburgh
Kerrick Bros., Birmingham, England.

Cotton Covered

AN IMPORTANT feature in the manufacture of our cotton covered magnet wire is the proper selection of the cotton stock. Every bit of yarn is thoroughly tested in our laboratories to make certain that our rigid specifications for uniform first quality, long-fibre Sea Island cotton are met.

This care in selection applies as well to the copper conductor—round, square or rectangular. Only the best grade, conforming to Mathiessen's standard, is used.

These specifications, and the corresponding inspections, follow the wire during the course of manufacture until it is shipped, layered exactly on each spool, and well protected against rough handling during transportation.

Belden Manufacturing Company
Twenty-Third Street and Western Avenue
Chicago
Eastern Office and Warehouse: Metuchen, N. J.

The Standard of Quality

PERFECT
MICANITE
INSULATOR

The same standard is also maintained in Empire, Linotape, Kablak and Mico.

They are well known in the Railway Shops because of their durability, high resistivity and low cost.

Why not become familiar with them in your shops? They will merit the acquaintance

MICA INSULATOR CO.
Manufacturers
68 Church Street, New York 542 So. Dearborn St., Chicago
Works: Schenectady, N. Y.

INTERNATIONAL FARE REGISTER

Type R-10
Single Register

International Fare Registers. Single registers, round and square; double registers, duplex counters, car fittings, foot-operating devices for single and double registers. Exclusive selling agents for Heeren enamel cap and coat badges.

The International Register Co.
15 South Throop Street, Chicago

A Long Record of Satisfactory Performances

For nearly 15 years American Railways have standardized on

B-V Punches

Because—

their tool steel dies last the longest.

Their finely tempered springs never break.

Their workmanship has always measured up to an ideal.

Send for Catalog

Bonney-Vehslage Tool Co.
Newark, N. J.

Ask any railway employee who has used

"AMERICAN BRAND"

Punches, Buttons and Badges

—he will tell you how satisfactory they are!

"AMERICAN" BRAND
OPEN SIGHT

AMERICAN RAILWAY SUPPLY CO.
134-136 CHARLES STREET . NEW YORK

WE CAN CUT YOUR COST OF HEATING CURRENT

Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

BUCKEYE JACKS

high-grade R. R. Track and Car Jacks.

The Buckeye Jack Mfg. Co.
Alliance, Ohio

162 RAILROADS
USE DIXIE CUP
Penny Vending Machines
To Solve their Drinking Cup Problems
in Cars and Stations
INDIVIDUAL DRINKING CUP COMPANY, INC.
HUGH MOORE, President
Original Makers of the Paper Cup — 220-230 W. 19th Street New York

Smith-Ward
Brake Slack Adjusters
Are Safe

The automatic adjustment afforded by the Smith-Ward Brake Slack Adjuster does something more than save charges for human labor.

The Smith-Ward Brake Slack Adjuster also saves charges for human negligence.

Because of bad light or severe weather conditions a lot of human adjustment of brakeshoe wear is largely perfunctory.

Result: Many an accident due to the fact that the shoes were improperly set, so that the brakes failed to do what the motorman had the right to expect.

Make the excuse, "The brakes failed to work," impossible on your lines.

Smith-Ward Brake Co.
233 Thirty-seventh St., Brooklyn, N. Y.

TROLLEY Catchers and Trolley Retrievers made by C. I. Earll, York, Pa., are well designed, well built, simple and effective. They are easy to operate and maintain.

Send for sample and try them out

C. I. EARLL, York, Pa.

Use them in your terminals—
PEREY TURNSTILES
or PASSIMETERS
Faster than the ticket seller
Perey Manufacturing Co., Inc.
30 Church Street, New York City

DIFFERENTIAL
CAR COMPANY
FINDLAY, OHIO

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

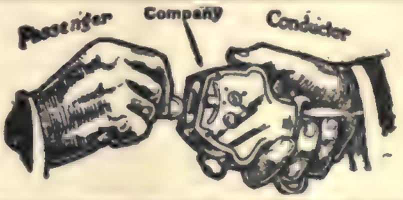
Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

Cleveland Fare Boxes
take your fares direct from Car Rider
to Counting Room
The Cleveland Fare Box Company
Cleveland, Ohio
Canadian Branch: Preston, Ontario.

BAKELITE-DILECTO
The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods. The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate.

The Continental Fibre Co., Newark, Delaware
Branch Offices:
CHICAGO, 332 S. Michigan Ave. NEW YORK, 233 Broadway
Pittsburgh Office, 301 Fifth Ave. San Francisco Office, 525 Market St.
Los Angeles Office, 411 S. Main St.
Canadian Office, 1710 Royal Bank Bldg.,
Cor. King and Yonge Sts.
Toronto, Ont.,



Direct
Automatic
Registration
By the
Passenger
Rooke Automatic
Register Co.
Providence, R. I.

Heating and Ventilating
Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost
The Cooper Heater Company
Carlisle, Pa.

WHAT HAVE YOU
FOR SALE
FOR RENT
FOR EXCHANGE
?
Up-to-date buyers in the coal mines watch the Second-Hand Equipment pages of Coal Age.
68

ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

ADVERTISING RATES

POSITIONS VACANT—Business Opportunities and other undisplayed ads. 8 cents a word, minimum $2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment. 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:

1 to 3 in., $4.50 an in.	15 to 29 in., $3.90 an in.
4 to 7 in., $4.30 an in.	30 to 49 in., $3.80 an in.
8 to 14 in., $4.10 an in.	50 to 99 in., $3.70 an in.

POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

ASSISTANT master mechanic, experienced, progressive and energetic on a road operating about 1,000 cars in a large city in the East; good opportunity; communications treated confidentially. P-794, Elec. Ry. Journal.

AUDITOR wanted for street railway in Eastern city; highest personal references required. Give full particulars when replying. P-792, Elec. Ry. Journal.

FIRST-CLASS barn foreman wanted for division barn on large city and suburban road. One who can use lathe and understands care and maintenance of equipment. Give experience, reference and salary expected in first lteer. P-804, Elec. Ry. Journal.

MAN wanted familiar with freight accounting to take charge of freight cacounts of large electric railway in eastern Pennsylvania. The man to handle this position must be experienced in handling general and agents accounts. System used similar to steam roads. Business is growing rapidly and a good future is offered to the right man. Apply in writing, stating age, experience, references and salary expected. P-814, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

MASTER mechanic wanted for Middle West on a division operating 40 interurbans on 600-1,200 volts. P-787, Elec. Railway Journal, Leader-News Bldg., Chicago.

TIMETABLE maker and depot clerk wanted for street railway in Eastern city. Must first qualify as competent motorman under peculiar local conditions. Give full particulars when replying. P-793, Elec. Ry. Journal.

POSITIONS WANTED

APPRAISAL and valuation engineer desires correspondence with officers or general managers who anticipate having a valuation made of their property. I am now finishing a valuation of an electric street railway for "Service at Cost" plan for operation. PW-797, Elec. Ry. Journal.

"ELECTRICAL HAND BOOK"

The "Burgess Blue Book" contains drawings and diagrams of Electrical Machinery and Connections—Starting Boxes, Elevators, Controllers, Starters for Printing Press Motors, Street Car Controllers, Transformer Connections, Lighting Circuits.

The section on Calculations takes up Simple Electrical Mathematics, Wiring Tables, Alternating Current Calculations, etc. It also gives 200 formulas, with problems worked out, showing their application.

Price $1.00. If you decide not to keep it, your money will be returned.

BURGESS ENGINEERING CO.
752 East 42nd St., Chicago, Ill.

In Replying to "Blind" Ads

be careful to put on envelope the key number in the ad and also local address of office to which reply is sent.

10th Ave. at 36th St., New York.
935 Real Estate Trust Bldg., Phila.
533 Leader-News Bldg., Cleveland.
1570 Old Colony Bldg., Chicago.
531 Rialto Bldg., San Francisco.

Important

Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents—send copies.

POSITIONS WANTED

AUDITOR and accountant, high-class, desires change by first of year; 25 years' experience in steam and electric railroad, gas, electric and steam accounting. Capable of handling accounts of large corporation or company; familiar with interstate and state commissions accounting; salary $7,200. PW-788, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

DETECTIVE—man, age 32, formerly having charge of police and fire departments with a large railway company, desires a position at same with any corporation that needs a good man. Address, P. O. Box 464, Wilmington, Delaware.

MASTER mechanic now employed desires to make change; 17 years experience in all departments and types of control. Successful in handling labor. A1 references furnished. PW-795 Elec. Railway Journal, Real Estate Trust Bldg., Phila.

WORKING barn foreman, single truck road preferred. Can do any kind of wiring, controller repairs and wind armatures; 12 years' experience, both single and double truck. PW-798, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

POSITIONS WANTED

ELECTRICAL engineer; two years' test experience with large electrical manufacturer; two years' design of d.c. railway motors; age, 29, not married. Position wanted with electric railway operating on high voltage d.c., or with steam railroad contemplating electrification; minimum salary to start $3,000; available after 30 days' notice to present employer. PW-799, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

SUPERINTENDENT of transportation desires a change; age 41, clean, capable, progresive; 18 years' experience in handling transportation problems, public and labor; capable of taking on details of any city or suburban property; will consider any property that requires extra effort; best of references. Please give details. PW, 815, Elec. Ry. Journal, Old Colony Bldg., Chicago.

5—Rotaries—300 K.W.

600 volt, D.C., 25 cy. A.C. Trans. 15,000 volt with SWBD—1600 ea. 500 & 1000 kw. 60 cy. Rot. & MG. sets. $1650.00 per Station.

BARGAINS

Send for our used mach. list.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

WANTED

We are desirous of purchasing two second-hand double truck

Trailer Cars

closed, with low center entrance.

W802—Electric Railway Journal
935 Real Estate Trust Bldg., Phila., Pa.

COMPLETE POWER PLANT

FOR SALE

1—500 h.p. Westinghouse Compound Engine, Direct Connected to 550 volt Generator.

2—200 h.p. Harrisburg Engines, Belt Connected to Westinghouse Generators.

1—B & W Boiler, 2 Keeler Boilers, Water Heaters, Pumps, Piping, Switchboards and etc.

All in first class operating condition. Immediate delivery. Make us an offer.

The Lewistown & Reedsville Electric Railway Co., Lewistown, Pa.

FOR SALE

Two 300-H.P. 500 Volt MILL MOTORS

Two Westinghouse 300-h.p. 345 to 500 r.p.m., 500 volt, D.C., compound wound motors, with one spare armature, including two Cutler Hammer, 300-h.p., 500 volt, D.C. Starters.

Condition good. Ready for inspection. Reason for selling, voltage changed. Write

H. LLEWELLYN, General Purchasing Agent

PITTSBURGH STEEL PRODUCTS CO.

Union Arcade Bldg., Pittsburgh, Pa.

MAC GOVERN & COMPANY **POWER MACHINERY**

114 Liberty Street, New York, N. Y.

25 CYCLE SUB-STATION

COMPLETE

1—300 kw. Westinghouse Rotary Converter, 3 phase, 25 cycle, 625 volts D.C., 500 r.p.m.

3—150 kw. Single Phase Transformers, 6600 volts primary, 390 volts secondary.

Switchboard Panel complete with all necessary instruments.

The above outfit is offered as a unit for a quick sale.

Branch Offices:

Pittsburgh, Pa.	498 Union Arcade Bldg.
Seattle, Wash.	L. C. Smith Bldg.
Montreal, Que.	285 Beaver Hall Hill

New—Used—Rebuilt

MACHINERY AND SUPPLIES

for construction and industrial work.

READING ENGINEERING CO., INC.

154 Nassau St., New York

NEW
REBUILT

ELECTRIC MOTORS

REWINDING
REPAIRING

NEW A.C. MOTORS ¼ to 15H.P.—LARGE STOCK USED MOTORS
EXCELLANT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.

EST. 1895 4732-4-6 ST. CLAIR AVE., CLEVELAND, O. *INC. 19*

S EARCHLIGHT
ERVICE
ECURES
ATISFACTORY
ALES

2004

—a manufacturer

in Newark, N. J.

—saved $200

buying from an Indiana dealer in

—second-hand machinery

through his advertising in the

—searchlight section

It pays
to read the Searchlight.
It pays
to advertise in the Searchlight.

0058

Machinery in Stock for *Immediate Shipment*

ROTARY CONVERTERS

1—300 kw., Westg., 3-phase, 60-cycle, 370-v., A.C., 575-v., D.C., 600 r.p.m.

2—200 kw., G.E., 3-phase, 25-cycle, 85-v., A.C., 125-v., D.C., 8 pole, 375 r.p.m.

FREQUENCY CHANGER SETS

1—600 kva., Allis-Chalmers Frequency Changer Set, 300 r.p.m., 3-phase, 60-cycle, 2300-v. one end, 3-phase, 6600-v., 25-cycle on other end.

1—400 kw., G. E., 3-phase, 25-cycle, 6000-v. one side—2400-v., 2-phase, 60-cycle other side—375 r.p.m.

ARCHER & BALDWIN, INC.

114-118 Liberty Street, New York City
Telephone 4337-4338 Rector

Keep your Eye
on the

Searchlight

and your
Advertisements in it

FOR SALE

16 West. 56 Motors. 4 K-14 Controllers. 4 National type BB-4 Air Brake Equipments complete. 15 Double Truck Cars, 40-ft. long, mounted on Brill Trucks equipped with 4 GE-67 Motors, 2 K-6 Controllers, Air Brakes, etc., complete.

Electric Equipment Co.

Commonwealth Building, Philadelphia, Pa.

WILL SELL

MOTORS

West. 68 and 68 C

Immediate Delivery

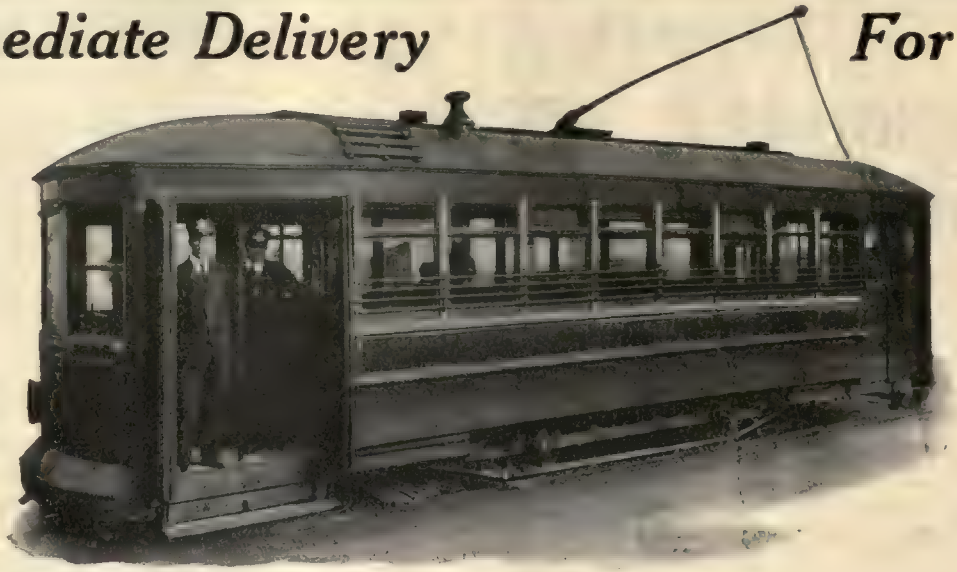
H. E. Salzberg Co., Inc.

30 Church St., New York City.

For Every Business Want: "Think SEARCHLIGHT *First"*.

0110

Immediate Delivery *For Sale*



SIX PREPAYMENT CARS (with reversible cross seats)

Builder	McGuire Cummings Mfg. Co.
Length over buffers	34 ft. 8 in.
Width over all	8 ft. 2 in.
Height over running board	11 ft. 0 in.

These cars are in splendid condition and ready for immediate service. Reversible Cross Seats upholstered in Rattan, seating 32 people. Doors and Steps Manually Controlled. Hot Air Heaters, HB Life Guards, Electric Signal Buttons, Pantasote Curtains.

TRUCKS

Builder	McGuire Cummings Mfg. Co.
Type	Columbian
Wheel base	8 ft.
Wheel diameter	33 in.
Axle diameter	4½ in.

ELECTRICAL EQUIPMENT

Includes two Westinghouse 101-B motors, controllers, circuit breakers and all of the appurtenances.

TRANSIT EQUIPMENT COMPANY, 501 Fifth Avenue, New York

Notice to Advertisers

Owing to the holidays "Searchlight" pages will close for press earlier than usual. Copy should reach us as follows:

December 25th issue:
Copy received up to 10 A.M. December 22nd

January 1st issue:
Copy received up to 10 A.M. December 29th

New Safety Cars

FOR SALE

Eight new single truck, double end, one-man safety motor passenger cars with two motors all fully equipped ready to run. Colors green and buff in enamel (numbered but not lettered).

Shipment Immediately from Car Works

Federal Light & Traction Company
60 Broadway, New York, N. Y.

Immediate Shipment

GIRDER RAIL

300 tons 7 in. girder rail, located Amityville, New York, also 1000 tons 70 lb. rail, 2000 tons 90 lb. rail. Write or wire for prices quoted.

M. K. FRANK, Pittsburgh, Pa.

The Searchlight Advertising in This Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

THE BEST PROOF

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable *demand* for such machinery or services, by its readers, the market place which these advertisements represent could not exist for any length of time.

Are *you* using the Searchlight Section?

NEW
80 lb. RAIL & ACCESSORIES

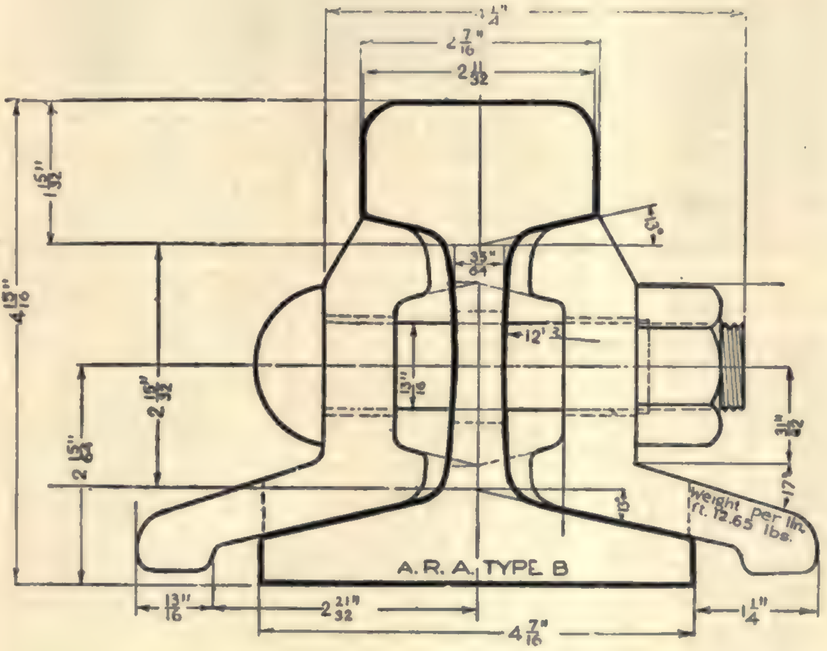
ANGLE BARS, SPIKES, BOLTS AND NUTS COMPLETE

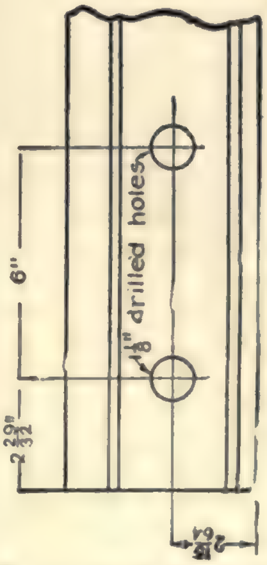
For Sale

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, N. J.





Note actual dimensions of rail stated hereon.

HYMAN-MICHAELS COMPANY

NEW AND RELAYING RAILS

Peoples Gas Building, Chicago, Ill.

New York Office
1324-1326 Woolworth Building

Pittsburgh Office
1312 First National Bank Building

We buy electric and steam railways that are to be dismantled

St. Louis Office
2115 Railway Exchange Building

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Ammeters
Weston Electrical Instrument Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Track Specialties Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Cambria Steel Co.
Midvale Steel & Ordnance Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Babbitt Metal
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
American Railway Supply Co.
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
Johns-Manville Co., Inc.

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
Post & Co., Inc., E. L.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bearings, Roller and Ball
Gurney Ball Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Benders, Rail
Niles-Bement Pond Co.
Reading Specialties Co.
Track Specialties Co.

Boilers
Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., Inc.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & Mfg. Co.

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes—Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Smith-Ward Brake Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Westinghouse Traction Brake Co.

Brooms, Track, Steel or Rattan
Paxson Co., J. W.
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Morganite Brush Co.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Buckets
Blaw-Knox Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
National Metal Molding Co.

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Carbon Brushes. (See Brushes, Carbon

Car Heaters
Economy Electric Devices Co.

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Midvale Steel & Ordnance Co.
National Ry. Appliance Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.

Catchers and Retrievers, Trolley
Earll, Chas. I.
Electric Service Supplies Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.

Checks, Employees
American Railway Supply Co.

Circuit Breakers
Cutter Electrical & Mfg. Co., The
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Combustion Systems
Engineer Co., The

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Mica Insulator Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Concrete Mixers
Blaw-Knox Co.

Condensers
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.

Conduits, Flexible
Tubular Woven Fabric Co.

Conduits, Interior
National Metal Molding Co.

Conduits, Underground
Johns-Manville Co., Inc.

Connectors, Solderless
Frankel Connector Co.
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Johns-Manville Co., Inc.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
Portable Machinery Co.

Conveyors, Coal and Ash
Green Eng. Co.
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Portable Machinery Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works
Trolley Supply Co.

Cord Connectors and Couplers
Electric Service Supplies Co
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Cranes
Niles-Bement-Pond Co.

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing)

Crossings, Frog & Switch
Wharton, Jr., & Co., Wm.

Crossings, Track. (See Track, Special Work)

Culverts
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Du Pont Fabrikoid Co.
Electric Service Supplies Co.

Cutouts
Chicago Fuse Mfg. Co.

Dealers' Machinery
Archer & Baldwin
Electric Equipment Co.
Foster Co., L. B.
Hyman Michaels Co.

Derailing Devices. (See also Track Work)
Cleveland Frog & Crossing Co.
Wharton, Jr. & Co., Wm.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging. (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Drinking Cups, Sanitary Paper
Individual Drinking Cup Co., Inc.

Dryers, Sand
Electric Service Supplies Co
Zelnicker Supply Co., Inc., Walter A.

Electrical Wires and Cables
Roebling's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Byllesby Engineering & Management Corp.
Clark Management Corp., E. W
Drum & Co., A. L.
Engel & Hevenor
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jackson, Walter.
Jacobs & Co., J. L.
Kelly, Cooke & Co.
Republic Engineers, Inc.
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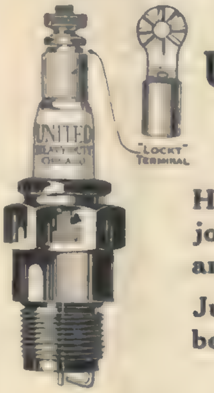

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Westinghouse Elec. & Mfg. Co.

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Cleveland Fare Box Co.
Johnson Fare Box Co.
National Railway Appliance Co.

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Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Star Brass Works

Fibre and Fibre Tubing
Continental Fibre Co.
Johns-Manville Co., Inc.
Westinghouse Elec. & Mfg. Co.

Field Coils. (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus
Johns-Manville Co., Inc.

Flaxlinum Insulation
National Railway Appliance Co.

Floodlights
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track. (See Track Work)

Funnel Castings
Wharton, Jr., Inc., & Co., Wm.

Fuses and Fuse Boxes
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville Co., Inc.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

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Chicago Fuse Mfg. Co.
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General Electric Co.

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Power Specialty Co.
Westinghouse Traction Brake Co.

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General Electric Co.

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Westinghouse Elec. & Mfg. Co.

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Brill Co., The J. G.

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Carnegie Steel Co.
Standard Steel Works Co.

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Electric Service Supplies Co.
Thayer & Co., Inc.
Westinghouse Elec. & Mfg. Co.

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Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gongs. (See Bells and Gongs)

Graphite
Morganite Brush Co.

Grates, Chain
Green Eng. Co.

Greases. (See Lubricants)

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Indianapolis Switch & Frog Co.
Metal & Thermit Corp.
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

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Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
More-Jones B. & M. Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Trolley Supply Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford-Chain Block Co.
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., The

Hose
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Hydraulic Machinery
Niles-Bement-Pond Co.

Injectors
Schutte & Koerting Co.

Inspection
Electrical Testing Lab's

Instruments, Measuring, Testing and Recording
General Electric Co.
Thompson-Levering Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec. Instrument Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Johns-Manville Co., Inc.
Mica Insulator Co.
Sherwin-Williams Co.
Standard Underground Cable Co.
Westinghouse Elec. & Mfg. Co.

Insulation. (See also Paints)
Anderson M. Co., A. & J. M.
Dolph Co., J. C.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., Inc.
Mitchell-Rand Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Insulators. (See also Line Material)
Anderson M. Co., A. & J. M.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Johns-Manville Co., Inc.
Ohio Brass Co.
Thomas & Sons Co., R.
Westinghouse Elec. & Mfg. Co.

Insulator Pins
Electric Service Supplies Co.
Hubbard & Co.

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Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.

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Rail Joint Co.
Reading Specialties Co.
Track Specialties Co.
Zelnicker Supply Company, Inc., Walter A.

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Bemis Car Truck Co.
Brill Co., J. G.

Junction Boxes
Standard Underground Cable Co.

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Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
National Electric Specialty Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent. (See also Headlights)
Anderson M. Co., A. & J. M.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
Ohio Brass Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
McCabe Lathe & Machinery Corp., J. J.
Niles-Bement-Pond Co.

Lightning Protection
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Johns-Manville Co., Inc.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Loaders, Wagon, Truck or Car
Portable Machinery Co.

Locking Spring Boxes
Wharton, Jr., & Co., Wm.

Locomotives, Electric
Brill Co., The J. G.
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Lubricating Engineers
Galena-Signal Oil Co.
Texas Co.

Lubricants, Oil and Grease
Galena-Signal Oil Co.
Texas Co.

Machine Tools
Columbia M. W. & M. I. Co.
Niles-Bement-Pond Co.

Machine Work
Columbia M. W. & M. I. Co.

Machinery, Insulating
American Insulating Machine Co.

Magnet Wire
Belden Mfg. Co.

Manganese Steel Castings
Wharton, Jr., & Co., Wm.

Manganese Steel Special Track Work
Wharton, Jr., & Co., Wm.

Meters (See Instruments)
Electric Service Supplies Co.

Mica
Mica Insulator Co.

Mirrors for Motormen
Drew Elec. & Mfg. Co.

Molded Insulation and Parts
Belden Mfg. Co.

Motormen's Seats
Electric Service Supplies Co.
Wood Co., Chas. N.

Motors, Electric
Westinghouse Elec. & Mfg. Co.

Motors and Generators, Sets
General Electric Co.

Molding, Metal
National Metal Molding Co.

Nuts and Bolts
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.

Ohmmeters
Weston Elec'l Instrument Co.

Oils. (See Lubricants)

Oil Burning Equipment
Schutte & Koerting Co.

Oxy-Acetylene (See Cutting Apparatus Oxy.)

Packing
Post & Co., Inc., E. L.
Westinghouse Elec. & Mfg. Co.

Paints & Varnishes (Preservative)
Sherwin-Williams Co.

Paints and Varnishes (Insulating)
American Di-Electrics, Ltd.
Dolph Co., John C.
Johns-Manville Co., Inc.
Mitchell-Rand Mfg. Co.
Sherwin-Williams Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.
Sherwin-Williams Co.

Paving Material
American Brake Shoe & Fdry. Co.

Pickups, Trolley Wire
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions. (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Pipe Fittings
Power Specialty Co.
Standard Steel Works Co.
Westinghouse Traction Brake Co.

Planers. (See Machine Tools)

Pliers, Insulated
Electric Service Supplies Co.

Plugs
National Metal Molding Co.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Reinforcing
Hubbard & Co.

Poles, Metal Street
Bates Expanded Steel Truss Co
Electric Railway Equipment Co.
Hubbard & Co.

Pole Sleeves
Drew Elec. & Mfg. Co.

Poles, Posts, Piling and Lumber
Duncan Lumber Co.

Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Electric Railway Equipment Co.

Power Saving Devices
National Ry. Appliance Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Pumps
Schutte & Koerting Co.

Punches, Ticket
American Railway Supply Co.
Bonney-Vehslage Tool Co.
International Register Co., The
Wood Co., Chas. N.

Purifiers, Feed Water
Scaife & Sons Co., Wm. B.

Rails
Cambria Steel Co.
Foster Co., L. B.
Lackawanna Steel Co.
Midvale Steel & Ordnance Co.

Rail Grinders. (See Grinders)

Rail Joint Plates
Lackawanna Steel Co.

Rail Welding. (See Brazing and Welding Processes)
Rail Welding and Bonding Co.

Rails, Relaying
Foster Co., L. B.
Zelnicker, Walter A., Supply Co., Inc.

Rails, Steel
Carnegie Steel Co.

Railway Safety Switches
Westinghouse Elec. & Mfg. Co.

Rattan
Brill Co., The J. G.
Electric Service Supplies Co.
McGuire-Cummings Mfg. Co.

Registers and Fittings
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Rooke Automatic Register Co.

Reinforcement, Concrete
American Steel & Wire Co.
Carnegie Steel Co.

Repair Shop Appliances. (See also Coil Banding and Winding Machines)
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Repair Work. (See also Coils)
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & Mfg. Co.

Replacers, Car
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Reading Specialties Co.

Resistance, Grid
Columbia M. W. & M. I. Co.

Resistance, Wire and Tube
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Retrievers, Trolley. (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Rivet Heaters
American Car & Founry Co.

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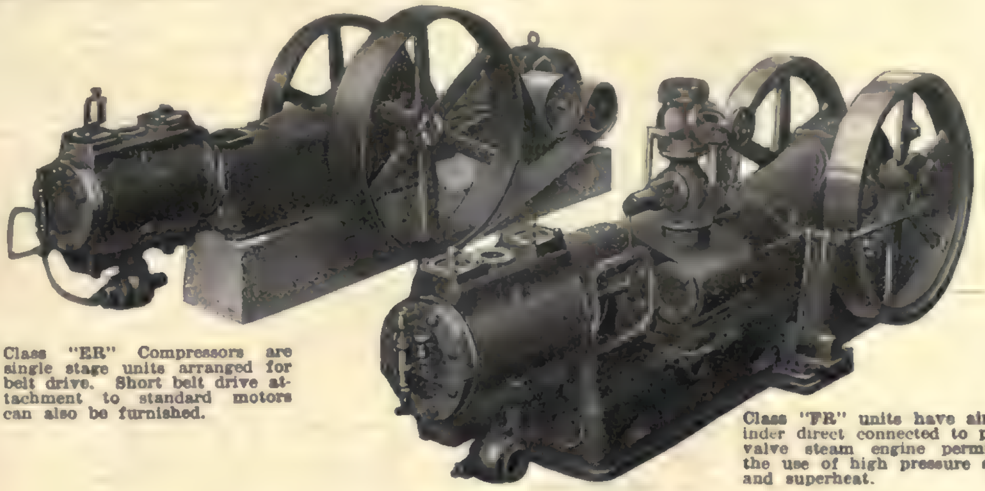

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FACTORIES:
York, Pa., and Weehawken, N. J.

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- Belden Mfg. Co.

Sanders, Track
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Ohio Brass Co.

Sash Fixtures, Car
- Brill Co., The J. G.

Scrapers, Track. (See Cleaners and Scrapers, Track)

Seating Material
- Du Pont Fabrikoid Co.

Seats, Car. (See also Rattan)
- Brill Co., The J. G.

Second-Hand Equipment
- Archer & Baldwin
- Cleveland Armature Works
- Foster Co., L. B.
- Hyman Michaels Co.
- Zelnicker Supply Co., Inc., Walter A.

Shades, Vestibule
- Brill Co., The J. G.

Shovels
- Brill Co., The J. G.
- Hubbard & Co.

Signals, Car Starting
- Consolidated Car Heating Co.
- Electric Service Supplies Co.
- National Pneumatic Co., Inc.

Signal Systems, Block
- Electric Service Supplies Co.
- Nachod Signal Co., Inc.
- U. S. Electric Signal Co.
- Wood Co., Chas. N.

Signal Systems, Highway Crossing
- Nachod Signal Co., Inc.
- U. S. Electric Signal Co.

Slack Adjusters. (See Brake Adjusters)

Slag
- Carnegie Steel Co.

Sleet Wheels and Cutters
- Anderson Mfg. Co., A. & J. M.
- Bayonet Trolley Harp Co.
- Columbia M. W. & M. I. Co.
- Drew Electric & Mfg. Co.
- Electric Railway Equipment Co.
- More-Jones Brass & Metal Co.
- Nuttall Co., R. D.

Snow-Plows, Sweepers and Brooms
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Consolidated Car Fender Co.
- McGuire-Cummings Mfg. Co.

Sockets and Receptacles
- National Metal Molding Co.

Soldering and Brazing Apparatus. (See Welding Processes and Apparatus)

Solderless Connectors
- Frankel Connector Co.

Spikes
- American Steel & Wire Co.

Splicing Compounds
- Johns-Manville Co., Inc.
- Westinghouse Elec. & Mfg. Co.

Splicing Sleeves. (See Clamps and Connectors)

Spray Nozzles
- Schutte & Koerting Co.

Springs, Car and Truck
- American Steel Foundries
- American Steel & Wire Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Standard Steel Works Co.

Sprinklers, Track and Road
- Brill Co., The J. G.
- McGuire-Cummings Mfg. Co.

Steel Castings
- Wharton, Jr., & Co., Wm.

Steel Forms
- Blaw-Knox Co.

Steps, Car
- American Mason Safety Tread Co.
- Universal Safety Tread Co.

Stokers, Mechanical
- Babcock & Wilcox Co.
- Westinghouse Elec. & Mfg. Co.

Storage Batteries. (See Batteries, Storage)

Strand
- Copper Clad Steel Co.
- Roebling's Sons Co., J. A.

Structural Steel
- Lackawanna Steel Co.

Superheaters
- Babcock & Wilcox Co.
- Power Specialty Co.

Sweepers, Snow. (See Snow Plows, Sweepers and Brooms)

Switch Stands
- Indianapolis Switch & Frog Co.
- Ramapo Iron Works

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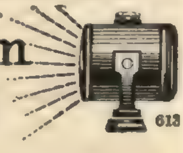

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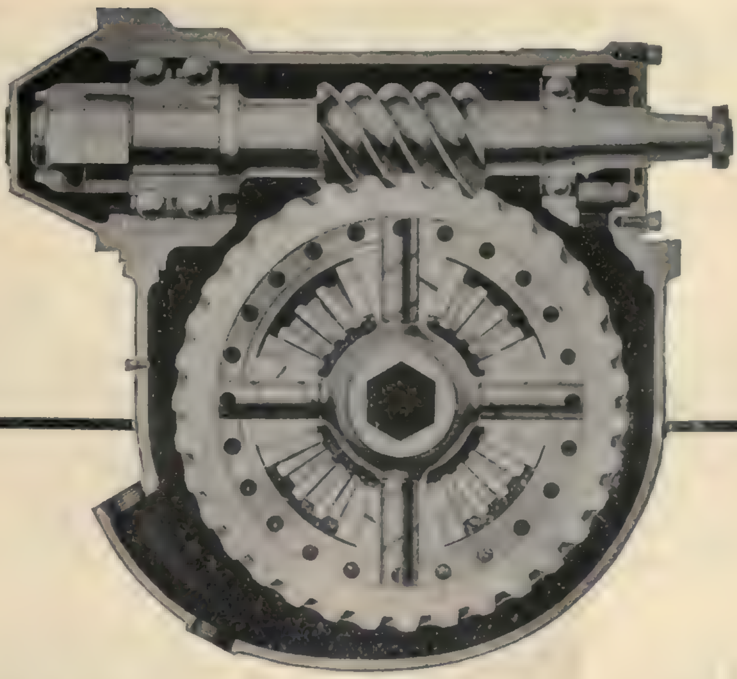

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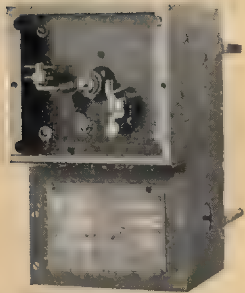

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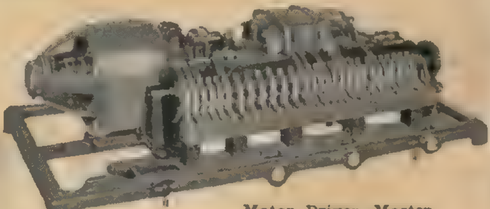

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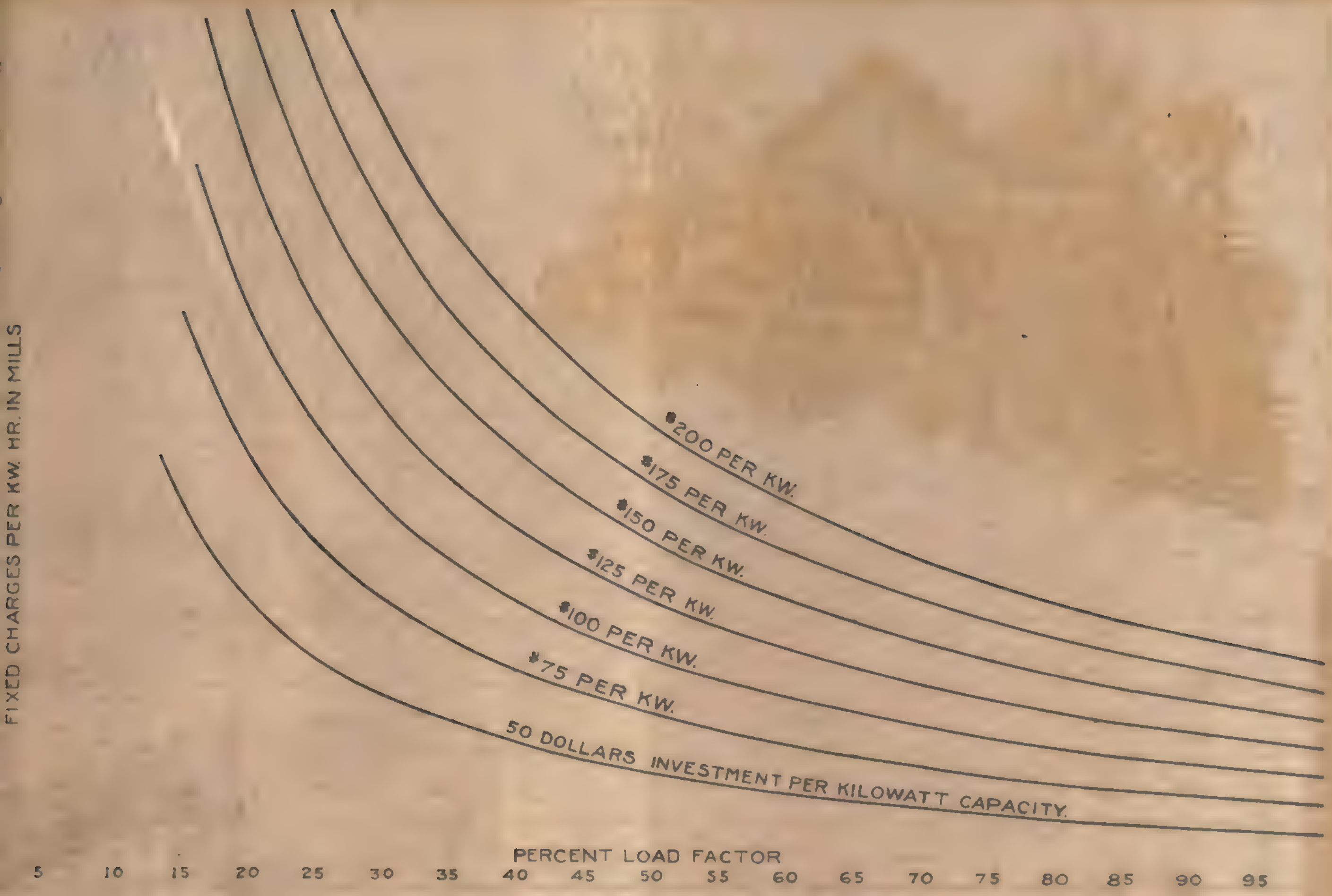

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"Do your trainmen like the Safety Cars?"

Of the fifty-five answers, there was not one "definite 'no'" to use the expression of the committee.

The downright "yeas" were overwhelming; but perhaps the most notable statement in the report was that of an Amalgamated Division President who wrote:

"Our men praise the cars as they are light, easily operated and successfully climb our steep grades; in fact do everything that is claimed for them."

There it is in a Nutshell

The Genuine Safety Car makes good because it actually does do all that is claimed for it, but it can make good only because it carries the famous Safety Devices combination which comprises automatic laborless apparatus so interlocked that regardless of the illness, etc., or distraction of the operator, the power will be cut off instantaneously, the airbrakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

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Chicago San Francisco New York Washington Pittsburgh

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Wherever There's Feeder in Parallel

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Bridgeport Connecticut

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Trolley Materials, Rail Bonds,
High Tension Insulators,
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"You Are Paying More for Poor Bonding Than Good Bonding Costs." O-B Bonds Are Good Bonds. A few representative types are shown here.

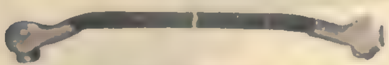
Type AW-3 Bond for Ball of Rail. Also made for Base of Rail

O-B Arc Weld Bonds have four fundamental features which simplify installation and make a better weld possible.

Type ST-2 Bond.

O-B Gas Weld Bonds were pioneers. They are still first.

Type F 3 Bond.
Concealed Type of Bond, installed under splice bar.



Type E-2 Bond.
A long bond for around the splice bar. Especially valuable on joints where rail movement is considerable.

O-B Stud Terminal Bonds are made in all lengths and capacities with either compressed or pin driven terminals.

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COPPER WIRE
From Ore to Finished Product

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For transmission lines a uniform wire of great tensile strength is essential.

Anaconda copper wire is made from pure electrolytic copper of which the average metallic impurity content is less than 1/100 of 1%; and as it is built up from ore to finished product with rigid inspections interposed throughout the entire process, its users are assured a commercially perfect wire.

The Booklet "From Ore to Finished Product," is now ready for distribution.

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What Is the Lowest Priced Paved Street Track Design?

Understood, of course, that the construction must meet the City Engineer's requirements as a support for the paving in the track space.

In entering Steel Twin Tie construction in this competition when you are preparing estimates we only request that we be allowed to put the complete data in your hands.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

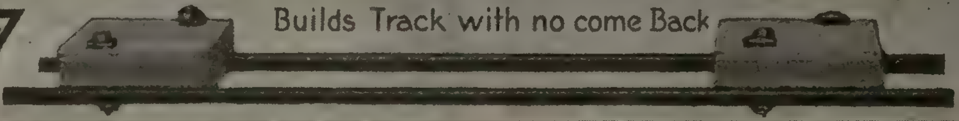
General Sales Office and Works: Cleveland, Ohio

The RESILIENT RAILWAY TIE

DMT Co

Builds Track with no come Back

DMT Co



Reclamation vs. Reconstruction

Are you worrying about the thousands which must be spent for track reconstruction on your property next spring, because the joints are bad?

The Dayton Joint Booster

will, in nine cases out of ten, provide the remedy and postpone this large outlay of money for reconstruction for several years.

The track pictured here was considered beyond repair, but was reclaimed with Dayton Joint Boosters for less than one year's interest on the cost of new work. And there was no interruption to traffic.

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THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

The Genuine Shelby

Seamless Cold Drawn Steel Trolley Pole

SCIENTIFICALLY designed and tested to detect flaws in material, this pole is so superior to the ordinary equipment sold and used that it will be well worth your while to get full information from us in regard to it.

Theoretically the greatest strain on a trolley pole is at the point of support, the strain tapering off to zero at the point where the load is applied.

The Shelby Seamless Cold Drawn Steel Trolley Pole is designed to meet this condition. It is manufactured from 13 gauge material in two types—Standard "A" and Standard "B." A reinforcement of the same material, inserted cold under pressure and made integral with the pole, gives the necessary additional strength at the butt where the greatest strain comes and the length of this reinforcing brace is increased from 16 in. long in the Standard "A" pole to 24 in. in the Standard "B," designed to meet the most severe service conditions. There is a taper beginning about a foot from the tip of the pole which reduces the diameter down to fit the standard trolley harp.

Every pole is tested in a specially designed machine which infallibly detects any imperfection and any which does not stand the test is rejected.

More detailed information is yours for the asking and we would appreciate the opportunity of submitting specifications and complete data on these poles.

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Manufacturer of Railway Material and Electrical Supplies

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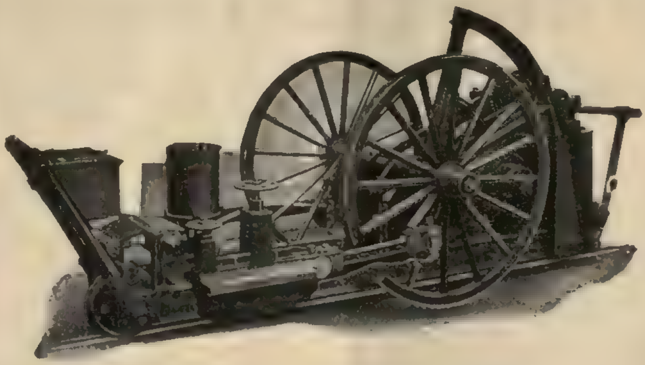
You must choose one So which one?

The Reciprocating Track Grinder

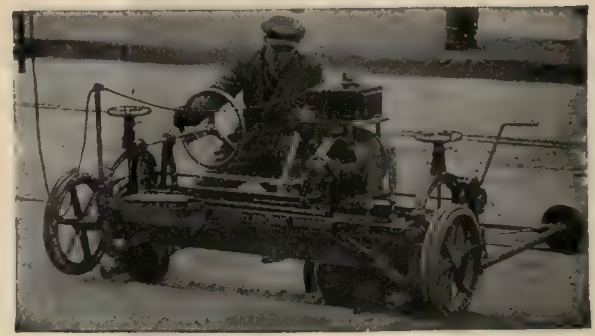
gives positive satisfaction under all working conditions. The planetary motion of the grinding element insures a smooth tractive surface.



Tell us about your Track

The Atlas Rail Grinder

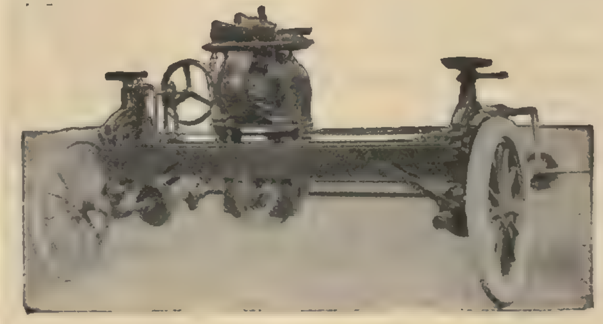
is low in first cost and maintenance. It is just the machine for removing surplus metal used in filling up low joints by arc welding.



We can then suggest the Grinder

The Universal Rotary Track Grinder

is built along the lines of the Atlas Rail Grinder but has several additional features of advantage and improvement, justifying the slight additional first cost.



It will do the work Successfully

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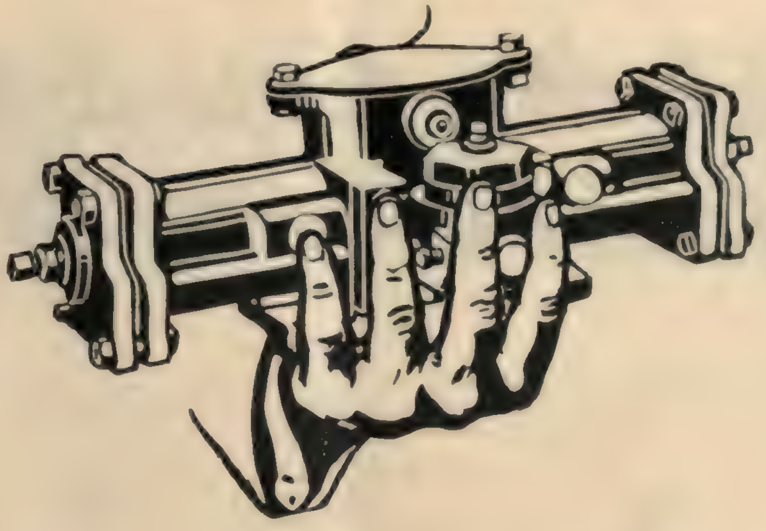

Standardize! *Pneumatize!*

"That yankin' is what destroys them doors"

"Pullin' 'em like that. That's the way y' get the rubber off."

That's exactly what the motorman said to his conductor one cold November morning as the latter rushed off the front end to snatch a can of hot coffee at a lunch wagon. He didn't like the violent way his mate pulled the door open.

We don't know whether the motorman said this because he was deeply interested in keeping down his employer's door upkeep expense or because he knew from previous winters how disagreeable it would be for him and his passengers to have a cold blast driving past a supposedly-closed door.

We do know, however, that because doors which are opened and closed with National Pneumatic Door and Step Control don't have to be slammed or yanked about, their runways, fixtures and pneumatic door buffers or cushions serve many thousands of miles with no maintenance attention whatsoever and go a long way to permit efficient, comfortable heating.

National Pneumatic Company

Originators and Manufacturers of

National Pneumatic Door and Step Control
National Pneumatic Motorman's Signal Lights
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Make your peak periods produce maximum profit and efficiency

National Pneumatic Company, Inc.

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Works: Rahway, N. J.

Manufactured in Canada By Dominion Wheel & Foundries, Ltd., Toronto, Ont.

Now is the time to make profitable investments

Never was there a greater opportunity than today to make profitable investments. High grade, gilt edge securities are paying 7 to 8%—sometimes more.

But remember this, all the investments paying high rates of interest aren't in the form of bonds or other industrial securities.

Hundreds of Electric Railways throughout the country are reaping dividends measured in thousands of dollars through the investment of but a few hundreds. Gross receipts are being increased 3 to 10%—greater public good will is being established—operating difficulties are being overcome through a comparatively small investment in Johnson Fare Boxes.

We repeat—never was there a greater opportunity than today to make profitable investments. When you consider Johnson Fare Boxes as an *investment*—an investment that will increase *your* gross revenue 3 to 10%—you will realize that today is the logical time to get all the facts in connection with their cost, installation, maintenance and rate of return on capital invested.

Our Engineering Department is prepared to supply this data. Write today.

JOHNSON FARE BOX COMPANY

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Found The World Over

Examine the Design!

Note that the draw chain winds upon the *upper* eccentric and the adjustable check chain upon the *lower* eccentric.

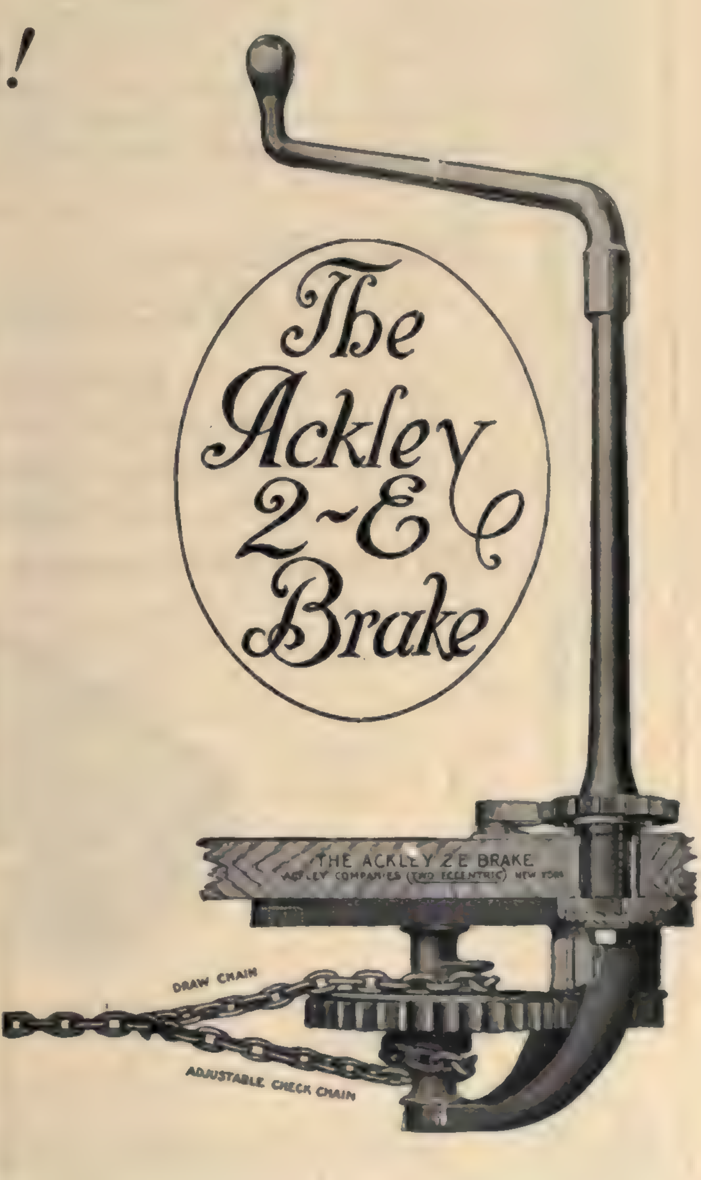
The Ackley 2-E is the only staff brake in which the draw chain cannot overlap or catch in the frame.

Adjustable to any angle of pull.

Equipped with pinion roller bearing.

Weighs only 35 pounds.

Ideal for your safety cars.



The Ackley No-Staff—Bulletin D
The Ackley 2-E (Staff)—Bulletin E

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Six factors of quality which make IRVINGTON the superior insulation

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Another important factor which makes IRVINGTON a superior insulation is the fact that this Company is the only concern manufacturing insulation that is equipped with its own bleachery for finishing cotton fabrics and preparing same by a special process for insulating purposes. Specializing on insulating finishes we are able to produce varnish cambric with a great tensile and high dielectric strength.

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Large stocks of IRVINGTON Insulation carried by the following representatives:

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The World's best Lubricants

Common Sense

interprets business efficiency as the art of exacting good service without excessive cost.

That GALENA LUBRICATING OILS render good service—exceptional service—is a fact too well known to be disputed—but, what do they cost?

Strange to say, they cost no more than other lubricants made and sold for the same purpose; but still stranger, is the fact that by units of service—mileage and kilowatt hours—they cost far less!

This in itself is a good, sound reason why these oils are in general use on the representative railroads everywhere, but another important factor is the recognition of their ability to save and preserve equipment, a feature that must be considered in lubrication costs, which necessarily should include the expense of repairs and replacements due to faulty lubrication.

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GALENA SERVICE

Protection that increases the life of any installation is not only direct economy but aids a wise conservation of materials and labor.

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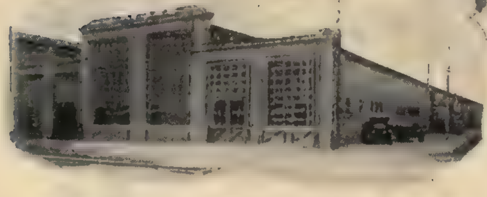

One of the buildings devoted to the manufacture of G-E Line Material

What Sherardizing means to your overhead

G-E electric oven sherardizing means long life to your overhead construction. Line material sherardized by the exclusive G-E process will resist rust to a surprising degree.

G-E sherardizing forms a coating that extends below the surface forming an integral part of the device so treated. Chipping or scaling is absolutely impossible.

See our test of G-E sherardizing at the A. E. R. A. Convention next month. It will convince you that G-E sherardized line material is the right kind for your overhead construction.

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Consolidation of Street Railway Journal and Electric Railway Review

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Volume 56 New York, Saturday, December 25, 1920 *Number* 26

Eight to Twenty Years for Meditation

DISORDER in the strike in Brooklyn last summer was sporadic. No general reign of terror existed, such as at Denver and other places where railway men have gone out recently. Still, the disorder assumed serious proportions at times. In one such outburst death resulted from the violence of the strikers. The strike has long since been forgotten, but not the strikers. It is one thing to strike, but it is another to be disorderly. Five strike rioters formerly in the service of the Brooklyn Rapid Transit Company whose activity resulted in the death of a young man pleaded guilty recently to manslaughter. They have been sentenced to Sing Sing. The lawyers for the men made a plea for clemency. Judge Cropsey, who passed sentence on the accused men, disagreed with their counsel. To the offenders he said: "You are all guilty of murder. I think every consideration was shown you when the District Attorney accepted your plea of manslaughter. You had the right to strike, but you did not have the right to interfere with any one who wanted to work." In thus expressing itself the court reflected the attitude of the general public in regard to those who practice strong-arm methods. The men under sentence to Sing Sing will have from eight to twenty years to ponder over Judge Cropsey's words. Organized labor everywhere should take the remarks of the court to heart at once.

Will National or State Commissions Establish Intrastate Rates?

THE controversy over what authority will control intrastate rates of interstate carriers is a subject of far greater importance to the steam railroads than to the electric railways. But there is one phase of the question in which the electric railways are greatly concerned, and that is the policy of commissions toward utilities which will follow the decision of the Supreme Court determining where the rate-making power lies. Wherever this power is found to rest, we sincerely trust that the governing authorities will have both the will and the power to make it possible for the utilities adequately to serve the public.

If there is to be rivalry in this matter of control between states and national commissions, let it be a rivalry to see which can best build up the utilities and increase the service which they are giving to the public at rates which while not being extortionate shall yet pay adequately for the cost of the service. Several of the states, through their commissions, have already taken the attitude that a solution to the steam railroad problem is needed and that the rates authorized by the Interstate Commerce Commission should have a fair trial in intrastate as well as interstate service. The California commission, for example, in its announcement to the carriers last summer apparently considered that obtaining service was of paramount importance. It realized that any questions of defining the relative authority of state and federal commissions could be considered just as fairly without delaying the relief the carriers needed in order to render service. This is a broadminded attitude which can well be accepted by others as the proper one to follow.

Somebody Has Commenced to Regulate the Highways

WE INQUIRED editorially some time ago (Aug. 14, page 303): "Who Will Regulate the Improved Highways?" pointing out at the time, and since, the rapid destruction of the public roads by motor trucks and the complicated but pressing questions of some sort of fair division of charges for the use of the roads. Electric railways and trunk lines are keenly interested in this allocation of charges and regulation of the present almost uncontrolled competition on the part of the motor trucks.

It is a pleasure for electric railway men and a healthy thing for the motor truck industry and for the public to note that Commissioner Bennett of Connecticut, in charge of the state highways, has commenced to regulate with an iron but just hand. Mindful of the effects of overloading, he has limited the gross weight of truck and load to 20,000 lb. and is enforcing the order. Connecticut, like many other small Eastern states, is commencing to feel the effects of trans-state shipments from which it derives no benefit but the roads for which the state provides free of charge to the motor industry.

As a result of the order, many motor truck men who have been loading up to fourteen tons gross are complaining that they cannot make their business pay under the limitations set. All this is true, too, without any attempt to make any additional charges upon the truck business.

Chicago, through her Lincoln Park Board, has set a similar limitation upon weight and weight distribution of the motor buses which operate through Lincoln Park.

All this looks good and sensible. It is not that the electric railways are glad to see any unjust restrictions placed upon a legitimate means of transportation, for the electric railway, as we have often pointed out, is the logical agency to operate motor vehicles within certain limits. But the electric railway which knows that, when all factors are considered, rail haul is frequently more economical is glad to see the regulation of competing agencies commence to take proper form. As we said before, the problem is very complex. We hope for a fair solution. Commissioner Bennett has at least made a good start in the matter.

A Psychological Moment for the Railway Movies

WITH the Pennsylvania Board of Censors in the lead there is appearing a widespread feeling against a certain form of movie film which it is said has become so common that it is the usual thing seen, and a change is wanted. We refer to the film whose story is based either on the "eternal triangle"—most common—or the luring vampire. Not that there is a noticeable falling off in movie attendance, but even the movie "fan" is beginning to ask why something else can't be found for a story.

If this is so and the movie people are at all on the lookout for new material—and they seem to show evidences of good business judgment—why is not now a psychological time to put forth a railway scenario such as has been discussed in these columns for the past three months and two samples of which were given in the issue of the JOURNAL for Nov. 27?

The Runaway Street Car Problem Again

THE casualties following the runaway of a street car on a steep grade in Kansas City last week bring up forcibly again the question of possible means for avoiding such an occurrence. Runaway accidents fortunately are uncommon, thanks to the safeguards which equipment designers have provided to prevent a car from getting away from the control of the motorman when on a grade, but when these accidents occur they are apt to be serious.

In Kansas City the accident was caused by the breaking of a ⅞-in. steel bolt in the clevis connecting the main brake pull rod with the brake cylinder piston, thus disconnecting both the air and hand-brake mechanisms. With the brakes thus inoperative, the car rushed down an 8 per cent grade, grazing or striking two other cars and a steel pole, and finally went to pieces after striking the second car. To the fact that the car was of the safety type and unusually light may be attributed the small injury to the cars hit. The "one-man" feature has been attacked, but it is hard to see how the presence of a conductor in the car would have prevented the accident. The evidence is not clear as to whether the motorman tried to reverse his motors or break the circuit and put the motors in the full parallel so that they would tend to retard the car. Probably he did not.

Measures to avoid an accident of this kind may take two forms. On roads with steep grades over private right-of-way the derail with sand track stop has been used. Derails have been installed to some extent also on hills in paved streets, but obviously they are not so satisfactory in such locations. In the second place, possible improvements in the usual car brake rigging might be made. One of these is the employment of box jaws on all rods and other connections, as was exhibited for use on surface cars at the Atlantic City convention for the first time last October. With this design the parts would still engage even if a pin broke or came out. As we remember it, this construction was first applied to safety cars in Oswego, N. Y., last summer. Another possible plan would be a series of stops such as have been worked out for double-truck cars, by which the rigging on one truck, if disabled, comes against a stop, leaving the rigging on the other truck operative.

Duplicate brake rigging could also be used, so that if one set should give way the other would be available, but clearly one set is better if it can be kept in good operating condition.

Use of But One Form of Propulsion Is Not an Innate Necessity

IN DISCUSSING the present and possible future development of the motor bus in its relation to mass transportation some long-time electric railway operators place more stress upon the means used for propulsion of public vehicles than on the purposes which such vehicles are intended to serve. They seem to feel that there is an inevitable and indissoluble connection between transit over rails and the carriage of large numbers of people. Surely, it is not well to look at the matter in this narrow way. The function of a public utility transportation system, as distinguished from individually hired or individually owned conveyances, is to carry the masses in the cheapest and most comfortable fashion. It simply happens that between the passing of the horse bus and the development of the self-propelled vehicle the horse car and then the electric car running on rails offered the only practical means for wholesale urban transportation. At bottom, those who give this service have but one problem regardless of the time. It is to adopt or adapt anything whatsoever that will enable them to carry out their special undertaking still better.

This eclectic attitude is compelled all the more by the fact that a monopoly of mass transportation must also include services where there are no "masses," or where the masses come only at irregular intervals. To meet such conditions the operator owes it to his stockholders to fulfill his monopoly obligations with the least possible loss. He will therefore look into any and every mode of transport equipment available, since it is *his* business to move people and not to worry about the type of equipment used. This is particularly the case where extensions have to be made. At present prices for track construction, buses may often be found more economical than cars, and it is fortunate for the railway manager that both are available.

The Norfolk Report Has Valuable Features

IN THIS issue the third and last of the series on the Norfolk (Va.) traction situation is presented. The report which these articles have analyzed has not been formally accepted by the city as yet, so far as we are advised, but it has apparently been well received by both city and company. Comment on the report, as a piece of public utility engineering work, is pertinent. In general it contains no radically new facts or ideas. It does, however, present some of these in a new light and it is very outspoken and frank on all points.

As to valuation, that moot question and the rock upon which so many otherwise satisfactory agreements are wrecked, Mr. Taylor says frankly that his decision is not subject to mathematical proof; it is nothing more than a "judicial" determination after certain "indices" of value are known. This, it appears, is only acting upon the recognition of the fact that the final determination of value as made by a commission is always upon such a basis, admittedly or not. While engineers in the past have no doubt frequently arrived at their final figures in this manner, it is not customary so to admit. The test of such a method will rest upon some court decision ultimately, but court decisions will be unnecessary when cities and utilities can agree upon a business-like method of dealing with each other.

Mr. Taylor's arguments on "historical investment," the right of the company to press for an appreciation of its past deficiency in earnings, and the theory of "service" depreciation all have novel elements which should be both interesting and useful to railway men and to commissions in their work of utility regulation.

Mr. Taylor's position in Norfolk was strengthened by the conditions under which we are informed he made the study. These were that the city and company desired a business-like settlement of their relations; that the city, employing Mr. Taylor, recognized him as a partisan of neither side and that the city recognized the right of capital legitimately invested in public utilities to be protected both as to principal and return.

Cutting the Coat to Fit the Cloth

WITH individuals as well as corporations, the more difficult it is to make ends meet the more urgent is it to follow some kind of a budget plan of estimating receipts and expenses. Moreover this plan must be effective in exerting control over expenses and, if possible, in stimulating growth in receipts. It is cold comfort, if any comfort at all, to make up estimates, if these contain merely inert figures with no suggestive power of improvement. If, however, the budget is recognized as a potent influence in the operation of a property, it is worth a considerable effort in compilation and administration. In connection with an application for increase in railway fares the existence of a going budget system could not but impress a public utilities commission favorably.

The attention of the ELECTRIC RAILWAY JOURNAL having been recently directed to the dearth of information regarding the budget plans of electric railways, the editors arranged for a short article on the system which has been in successful use by the Boston Elevated Railway for a decade or more. It was, we believe, inaugurated by C. D. Emmons when he was general manager of this railway, and it has been found especially useful under the trustee operation. The article appears in this issue and we plan to follow it with others on the same subject, bringing out as many of its aspects as possible. If any other railway can "go the Boston Elevated one better" as to budgets now is a good time to say so.

A word of caution, however, in regard to budgets may not be out of order, especially where they are made to exert control instantaneously. This is that momentary fluctuations in expenses should not be permitted to cause a cutting of service or of maintenance activities, which in the end will react unfavorably on the balance sheet; in fact, may prove to be a boomerang. The budget has just as important a function to perform in stimulating the getting of new business as in tightening the pursestrings. The adage suggested at the head of this article is all right as far as it goes, but sometimes it is necessary also to get more cloth.

Syracuse Loses an Opportunity

PROPOSED operation at service-at-cost has been rejected in Syracuse, N. Y. Chaos has followed. The New York State Railways, operating at a cumulative loss at 6 cents, has cut service and asked the Public Service Commission for a 10-cent fare. The city has rushed to the same commission for relief, contending that "the regulations and practices of the respondent are improper, unjust, unreasonable and illegal," charges which, the city forgets, the company may well bring against it for its negative attitude.

Negotiations looking toward a basis for the permanent settlement of the railway situation in Syracuse have been conducted for nine months. During this time a special commission reported in favor of a service-at-cost proposal and engineers employed by the city returned a property value of $12,450,000. While all this has been going on in Syracuse the city of Rochester, in which the New York State Railways also operates, has approved service-at-cost and is now operating at a 7-cent fare under the new grant.

The disposition in some quarters has been strong to contrast the two cities, and to make much of the fact that the Public Service Commission had approved a provisional valuation as the basis of the Rochester service-at-cost contract at a rate of something more than $58,000 to every 1,000 inhabitants, as against the appraisal of about $70,000 per 1,000 inhabitants for Syracuse. This great discovery was made by the Syracuse *Herald*, with which it has degenerated into a fetish.

It is of course foolish to contrast figures in this way, but a gullible public has evidently been impressed by the seeming deadly parallel. If this were all there were to valuation, then the value of a railway in any city could be obtained by multiplying a given base figure by the number of thousands of inhabitants in the city under consideration. This of course reduces the criticism which has been advanced at Syracuse, plausible though it may sound, to an absurdity. Density of population and the existing number of miles of track and number of cars are forgotten. Further, in the criticism of the valuation under review, the fact has been ignored that during the past few years several independent valuations have been made of the Syracuse lines. In one of these, McClellan & Campion reported the fair value of the property used in the public service in the Syracuse district as of June 30, 1920, based on present day prices, to be $21,012,201; based on average prices, 1915 to 1919, $16,663,300; and based on pre-war prices, $12,006,134. So $12,450,000 sounds reasonable.

It seems to us that if any comparisons were to be made between the two cities they had better be on the basis of the sense displayed by one city and the senselessness displayed by the other. Service-at-cost may not be the panacea for railway ills that some would hold it to be, but Rochester, under service-at-cost, has a means now of adjusting its railways problem amicably from time to time as questions calling for settlement arise. Syracuse, on the other hand, appears to be in for the perpetuation of the bickering which has been ushered in with the failure of the grant. Rochester is in a position where it can carry on; Syracuse is not. Credit has been restored to the Rochester lines and the program of improvements to be carried out as written into the new grant will soon be well on its way to realization. Syracuse, on the other hand, is slipping from bad to worse.

The Public Service Commissions of the Bay State

The Massachusetts Commission Is of Particular Interest Because of Its Early History and the Precedents It Has Established, Which Have Since Been Followed by Many Other States

THE BAY STATE CAPITOL, WHICH TOWERS ABOVE THE BOSTON COMMON

WHEN Public Service Commissions or Railroad Commissions are mentioned, the mind reverts at once to the State of Massachusetts, which was the pioneer in railroad and later in other public utility regulation.

Although the State has always recognized the railroads as having some obligations under its jurisdiction, probably the first provision for the control of the railroads by a State commission will be found in the Acts of 1864 of the Massachusetts Legislature. The wording of this act, entitled "An Act Providing for the Appointment of a Board of Railroad Commissioners, and Relating to Railroad Crossings at Grade," Acts of 1864, Chap. 152, quoted in part below, is surprisingly similar to many more recent provisions.

> There shall be a board of railroad commissioners, consisting of three persons, appointed and commissioned by the Governor, with advice and consent of the Council, and subject to removal in like manner—said commissioners, upon the application of any railroad corporation authorized to construct its road across a turnpike, highway, or townway, or of the proprietors of the turnpike, or the selectmen of the town, or the mayor and aldermen of the city in which the crossing is situated, after due notice to the railroad corporation, the proprietors of the turnpike, and such mayor and aldermen, or selectmen, not themselves being the applicants, and to any other persons or parties as they may direct, and after hearing the parties, may, if public necessity requires, authorize and require the railroad corporation to construct their railroad at such crossing, upon a level with such turnpike or way, in such manner as they may direct.
>
> If a corporation unreasonably neglects or refuses to comply with any order made under the preceding section, it shall forfeit for every such refusal or neglect a sum not exceeding one thousand dollars.

A feature in this act which would no doubt be considered a hardship by the railroads at present reads as follows:

> In all cases heard before commissioners under the provisions of this act, the expenses and costs attending the same, including the compensation of the commissioners, shall be paid by the railroad corporation. The compensation of the commissioners shall be $10 each per diem and traveling expenses.

The supervision of this commission over the railroads and the restrictions with regard to railway operation were gradually increased by legislative enactments during the subsequent years. In the eighties, a commission was provided for by the Legislature, to be appointed by the superior court, to study the needs and recommend the abolition of grade crossings.

The origin of commission regulation of gas utilities in Massachusetts is also of especial historical interest. The late Prof. William B. Rogers of Massachusetts Institute of Technology was asked by the Mayor and Board of Aldermen of the city of Boston, early in the year 1864, to make an investigation of the gas supply of the city. In the report, which is still a valuable record, submitted in response to this request, May 2, 1864, Prof. Rogers indicated the results of a most careful and scientific analysis of the candle-power and chemical content of the illuminating gas furnished the city at that time. The tests showed that 16.28 candle-power of illumination was available from a standard open burner through which 5 cu.ft. of gas was supplied per hour. This was probably the first thorough test which had been made, at least by parties without the corporation. As a result of this report the city authorities, and later the State of Massachusetts, inaugurated an increasingly rigid inspection, analysis and regulation under the direction of Professor Rogers as "Inspector of Meters and Gas," of the gas supply provided by the various corporations. This is believed to be the earliest attempt to regulate the quality of service rendered by utilities other than railroads by means of municipal or state boards.

In 1885 a board was created to have general supervision of gas companies and in 1887 the board's jurisdiction was extended to electric light companies. The gas inspection division, which originated as a distinct organization in the early sixties, was made a division of the board in 1902. On Nov. 30, 1919, the board ceased to exist, its powers being taken over by the newly created Commission of the Department of Public Utilities, as described later in this article.

In 1902 the Board of Railroad Commissioners still consisted of three commissioners appointed by the Governor for three-year terms. The salaries at this time were $5,000 for the chairman, and $4,000 for each of the other members. A clerk was provided, to be appointed by the Governor, at a salary of $2,500. The assistant clerk and inspectors were selected by the commission and were paid by the state $1,200 and $1,500 per annum respectively. The accountant's salary was established with a maximum of $2,500. Other expenditures of the commission were very definitely limited by law and a detailed annual report required for such expenditures.

An interesting provision for the payment of the expenses of the commission, although not so severe upon the railways as that previously quoted, still placed the burden upon the utilities. It is worded thus:

> The annual expenses of the board, including............ shall be apportioned by the tax commissioner among the several railroads and street railway corporations and, on or before the first day of July in each year, he shall assess upon each of said corporations its share of such expenses, in proportion to its gross earnings from the transportation of persons and property for the year last preceding the year in which the assessment is made; and such assessments shall be collected in the same manner as taxes upon corporations.

The organization of the Railroad Commission and the number of members included therein have been changed by frequent amendments. In the acts of 1906 it was composed of three members and called the Board of Railroad Commissioners. In 1913 the board was changed to five members and renamed the Public Service Commission. Two additional members were appointed by the Governor under the provision of this law. All the terms ranging from one to five years were to be assigned by the Governor regardless of the length of unexpired term of any member of the old board. New members were to be appointed subsequently for five-year terms. The salaries were raised in the law of 1913 to $8,500 for the chairman and $8,000 each for the other commissioners. No more than three commissioners could be appointed from any one political party under this enactment.

The work of the new commission was made by this act to include the common carriers, electric and steam, steamship lines, and the telephone and telegraph companies, as well as to include the functions of the old Highway Commission. The latter was merged into the Public Service Commission. It was permitted to inquire into the rates, regulations, practices, equipment and services of the common carriers, and be represented at public hearings before legislative committees, etc. It was authorized to examine the books and documents of the railroads and to prescribe forms for their accounts. Further provision was made in this Act of 1913 for the representatives of the commission to enter the premises of the utility to inspect its property or for any purpose consistent with the provisions of the act.

It was provided that the fair valuation of the property of the common carriers should be investigated by the commission when it was deemed necessary in order to carry out any provision of the act. Access to all books and documents was granted the commission for such purpose.

EARLY DECISIONS ON SECURITY ISSUES REQUIRED

Not only was it required that bonds or notes of more than twelve months' duration should be approved by the commission, but it was further specified that decision upon such an issue should be rendered within thirty days after the final hearing thereon. The law definitely provided that any mortgage executed by a railroad company should secure all bonds, notes and other evidences of indebtedness previously issued and then outstanding on equal terms with any other indebtedness secured by the mortgage.

Provision was made for such obligations to an amount which, when added to the amount of all its then outstanding bonds, notes and other evidences of indebtedness, would not cause the aggregate amount to exceed twice the amount of the capital stock of the corporation actually paid in at the time. Directors, other officers or stockholders who knowingly vote upon measures in opposition to this requirement may, under this act, be fined and imprisoned. Considerable protection was therefore provided against radical capitalization of utilities.

Zone systems for railroad fares were provided for, it should be noted, in the legislative act itself, which permitted the commission after investigation "to authorize a common carrier in special cases to charge less for longer than for shorter distances for the transportation of passengers or property, whenever in the opinion of the commission such authorization is consistent with the public interests."

Advocates of the electrification of steam roads will be interested in the definite provision in the Law of 1913 which granted authority to the commission to order, after a proper hearing, a railroad company to operate its lines or fractions thereof by electricity instead of steam power and to prescribe the time within which the work of electrification should be done.

Jurisdiction by the supreme judicial court was provided in equity to review, annul, modify or amend any rulings or orders of the commission which are unlawful *to the extent only of such unlawfulness*. Such court proceedings reviewing orders of the commission have preference over all other civil proceedings pending in such a court, except election cases.

CHANGES OF ORGANIZATION

The number of members constituting the commission, and therefore its personnel, have been frequently changed by the Massachusetts Legislature. As previously stated the staff in 1913 consisted of five men. The Acts of 1918 reduced the commission again to three men. The members at the time the act took effect retired and the Governor, with advice and consent of the Council, appointed one member for one year, one for two years and one for three years. Two were appointed from the former commission. The term of office was changed to three years.

ESTABLISHMENT OF PRESENT COMMISSION

In 1919, a more radical change was made in the Public Service Commission Law which again altered the organization of the staff. Chapter 350 of this general act, which is entitled "An Act to Organize in Departments the Executive and Administrative Functions of the Commonwealth," was approved July 23, 1919, and went into complete effect Dec. 1, 1919. As it changes quite radically the executive and administrative functions of the State and places the Public Service Commission in a rather unique relation to the other departments of the Commonwealth, a brief outline of its provisions may be of interest.

A "Department of Public Utilities" is established by the new act upon the same status as fourteen other departments, prominent among which were to be found those of Agriculture, Banking and Insurance, Corporations and Taxation, Education, Labor and Industries, Public Health, Public Works, etc. All executive and administrative offices, boards, commissions and other governmental organizations and agencies, except those serving directly under the Governor, or the Governor and Council, are placed in this department. Those not definitely provided for in the act are placed, by order of the Governor, under the direction and control of the departments above mentioned, subject to the direction of the Governor and the advice of the Council.

The Public Service Commission, existing under the Acts of 1913 and 1918, and the Board of Gas and Electric Light Commissioners, existing under the Acts of 1914, were abolished and all their rights, powers, duties and obligations were transferred to the Department of Public Utilities.

The latter department consists of five members appointed by the Governor with advice and consent of the Council. Their first terms range from one to five years, the standard length of term thereafter being five years. The Governor designates the chairman. The chairman receives such an annual salary as the Governor and Council may determine, not exceeding $8,000, and the other commissioners receive salaries not exceeding $7,000.

The chairman is not charged with any administrative functions, nor is it intended that any members of the commission nor the secretary shall devote his whole time to the work of the department.

In the hearing of all matters other than those of formal or administrative character, at least two commissioners are expected to participate, and in a decision, three members are required. In every case a majority of those participating is necessary for a decision. With the consent of all parties concerned in a matter coming before the commission, the hearing may be held by a single commissioner.

All the classes of corporations previously subjected to the jurisdiction of the Public Service Commission and the Board of Gas and Electric Light Commissioners are now regulated by the new department. As the railroads, with the exception of the Boston Elevated Railroad and the West End Railway, were formerly under the Public Service Commission and the telegraph and telephone companies were placed under it in 1918, practically the entire group of public utilities, including the highways in 1918, are now controlled by the Department of Public Utilities. The general court makes annual appropriations for the department and designates the portion to be used for salaries of employees and expenses in connection with the functions previously performed by the Board of Gas and Electric Light Commissioners.

SPECIAL STATE CONTROL OF TWO RAILWAY SYSTEMS

The two electric railway systems mentioned as exceptions to the jurisdiction of the former commission and the Department of Public Utilities as organized at present are regulated by the State more directly as provided in a special act of the Legislature in 1918. This act, Chapter 159, is entitled, "An Act to Provide for the Public Operation of the Boston Elevated Railway Company." It was approved May 22, 1918, and accepted by the company June 3, 1918.

This unique legislative proceeding provides for a board of trustees of five persons, appointed by the Governor, with the advice and consent of the Council. Their term of office is ten years and their annual salaries of $5,000 each are paid by the corporation. The board appoints its own chairman. If, after the term has expired, operation by the State is to be continued, trustees are to be appointed by the Governor for the succeeding period. The trustees manage and operate the railroad during their term of office. They have power to appoint and remove from office the president, treasurer, clerk and all other officers except the directors.

The powers of this board of trustees are rather more sweeping than those usually granted a public service commission. They may establish and regulate fares, including the issue and withdrawal of transfer privileges, and may determine the charges, if any, to be made for such transfers. The character and extent of service to be furnished are also within their jurisdiction. In these respects their authority is final and is not subject to the approval, control or direction of any state board or commission.

The trustees act as agents of the corporation and not of the State. The company is liable for acts of negligence, etc., just as in the case of other utilities and is not in any way freed from taxation by the State. The trustees are not personally liable. The corporation may make contracts and issue stocks and bonds as before. The stockholders elect directors to represent their interests, but the latter have no voice in the actual management of the railroad.

Another unique feature of the provision is to the effect that a reserve fund is to be provided of $3,000,000 in cash from the sale of cumulative preferred stock (par $100) approved by the present stockholders and not exceeding 7 per cent dividend. This is subject to retirement by the trustees or after the period of public operation at 105 with accrued dividends. This issue of stock does not require the approval of the Department of Public Utilities. Of this reserve $1,000,000 is to be set aside as a reserve fund to provide for deficit in income, while $2,000,000 is to be used by the trustees for additions and improvements.

The trustees fix the rate of fare from time to time to insure sufficient income to meet the cost of service, including operating expenses, taxes, rentals, interest on all debt, depreciation, obsolescence, losses, charges properly made to surplus, fixed dividends on all preferred stock and the following dividends upon common stock: 5 per cent first two years; 5½ per cent next two years; 6 per cent balance of period of public operation.

Common dividends are to be paid quarterly but none is to exceed the rates indicated. Provision is further made for the reimbursement of the fund by the State, when depleted.

The trustees are permitted to borrow money to pay the obligations pending such reimbursement. When the fund exceeds the required payments indicated, provision is made for the trustees to pay back past deficits to the State. This is distributed among the cities and towns in which the railroad operates in proportion to the amounts they have been assessed to pay deficits. Annual prescribed changes in rates for fare are to be placed in operation in case the income is too low or too great to maintain the reserve within predetermined bounds.

MASSACHUSETTS' FIVE COMMISSIONERS

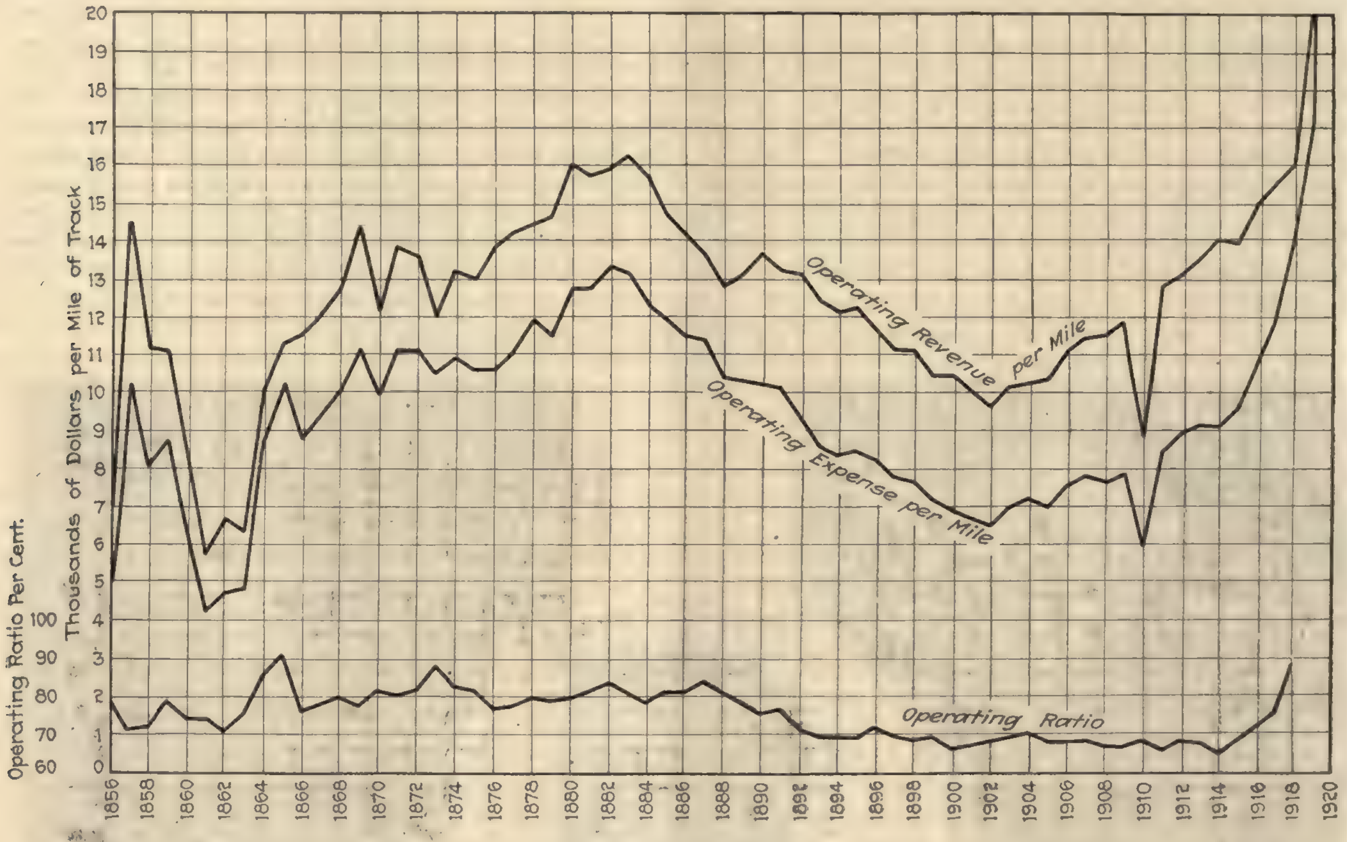
HENRY C. ATTWILL
Chairman

UPPER LEFT, HENRY G. WELLS; UPPER RIGHT, EVERETT E. STONE; LOWER LEFT, DAVID A. ELLIS; LOWER RIGHT, ALONZO R. WEED

Such public management of the railroad may continue beyond the ten-year period prescribed until the State elects to discontinue the process. In such a case two years' notice must be given.

A provision in 1911 for the control of the West End Railway by the Boston Elevated Railway Company causes the former to come within the jurisdiction of this act.

An example of still more direct supervision of the operation of the street railways by the State of Massachusetts is to be found in the General Acts of 1919, Chapter 359, entitled "An Act to Provide for an Investigation by a Special Commission of Problems Relating to the Street Railways of the Commonwealth." In accordance with this act, approved July 24, 1919, a temporary commission was established of three members of the Senate appointed by the President, five members of the House of Representatives appointed by the Speaker, and five persons, not members of the general court, appointed by the Governor, with the advice and consent of the Council. The duty of this commission was to make an investigation and study of the street railway situation of the Commonwealth with a view to determining what action may be required to promote the public welfare and convenience in relation thereto, what action should be taken for the purpose of securing lower fares, what portion of the expenses of operation if any, should be borne by the public treasury, what means should be used for the purpose of providing adequate and low priced transportation, and whether and to what extent public



AN INSTRUCTIVE FINANCIAL AND OPERATING HISTORY OF THE MASSACHUSETTS ELECTRIC RAILWAYS FOR SEVERAL DECADES

ownership is the proper solution of the street railway problem.

This commission made a voluminous report to the General Court in November, 1919, supporting the past activities of the Public Service Commission, but expressing the opinion that too large and varied responsibilities are being imposed thereon and that the State must take a more direct part in the administration of public utilities.

THE ORGANIZATION OF THE DEPARTMENT OF UTILITIES

As a result of the appointments by Governor Coolidge under the Legislative Acts of 1919 the following men make up the Department of Utilities:

1. Honorable Henry C. Attwill of Lynn, chairman, appointed for five years, Dec. 1, 1919.
2. Honorable Everett E. Stone of Springfield, appointed for four years.
3. Honorable Alonzo R. Weed of Newton, appointed for three years.
4. Honorable David A. Ellis of Boston, appointed for two years.
5. Honorable Henry G. Wells of Haverhill, appointed for one year.

Andrew A. Highlands, for many years secretary of the Railroad Commission, was named as secretary for the new department. Allan Brooks is assistant secretary.

The organization of the work of the department involves the following sub-departments or divisions:

1. Inspection of gas and gas meters, in charge of Charles D. Jenkins, inspector of gas and gas meters.
2. Railroads and street railways, in charge of Henry W. Seward, chief inspector.
3. Telephone and telegraph inspection, in charge of William H. O'Brien, chief of division.
4. Accounting department, in charge of Justice W. Lester.
5. Rate and tariff division, in charge of C. Peter Clark.
6. Engineering department, in charge of Henry W. Hayes.

As has been previously stated Prof. W. B. Rogers, in the early sixties, really established the precedent for the department of gas and gas meter inspection as the result of his pioneer scientific gas testing. As predecessor of the present head of the department, Prof. Rogers held the position for twenty-two years. He succeeded in breaking down a very marked ingrained distrust, on the part of the public, of gas meter accuracy. The testing laboratory established by Prof. Rogers was in operation for forty-five years in one location until recently moved to the State House.

The rendering of good service by a utility has been recognized by the commission as an engineering problem and competent professional engineers have been employed to direct the work of the various divisions. C. D. Jenkins, for eleven years assistant to Prof. Rogers, and now in charge of the gas division, imported gas testing apparatus from England in 1895 and as a result of his report to the Legislature upon the practical calorific values of gas, the original statutory candle-power standard was changed to a B.t.u. minimum of 528 units. Daily tests are required of the gas corporations and weekly averages, high and low values are recorded. Gas plants of 15,000,000 cu.ft. capacity and larger are required to maintain testing stations and unannounced check tests are also made by the inspectors employed by the department. Three successive violations of the specifications of any one element in the gas service render the utility liable for a fine of $100.

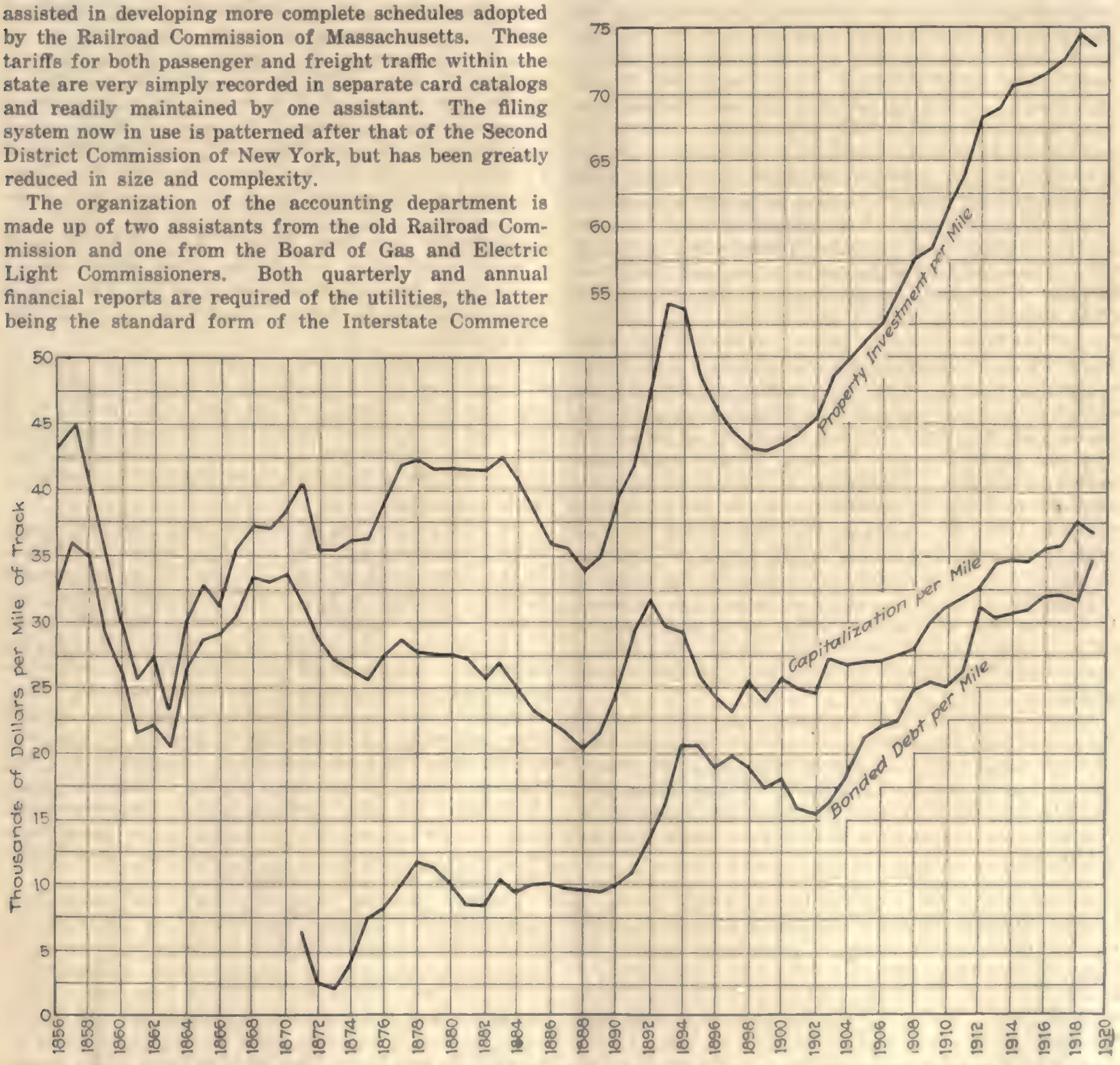
Electric meters are tested by the department only upon complaint. This work, which never reaches large proportions, is done at the Massachusetts Institute of Technology. The margin of error for gas meters is plus or minus 2 per cent and for electric meters 5 per cent. Either the corporation or the consumer may request a test, but in all cases the fee goes to the State. If the meter is found to be within the specified range of allowable error, the fee is paid by the consumer, otherwise by the corporation.

In connection with all the activities of the various departments of this commission the impression is evident that the work is being done with relatively little formality and few detailed or elaborate records. For example, although reports by utilities of serious accidents are required, as in other states, no forms are used and telephone or script statements are typewritten upon their receipt in very informal fashion.

In the regulation of rates and railroad tariffs by the State, Massachusetts was again the leader. In New York State dummy tariffs had been outlined which assisted in developing more complete schedules adopted by the Railroad Commission of Massachusetts. These tariffs for both passenger and freight traffic within the state are very simply recorded in separate card catalogs and readily maintained by one assistant. The filing system now in use is patterned after that of the Second District Commission of New York, but has been greatly reduced in size and complexity.

The organization of the accounting department is made up of two assistants from the old Railroad Commission and one from the Board of Gas and Electric Light Commissioners. Both quarterly and annual financial reports are required of the utilities, the latter being the standard form of the Interstate Commerce Commission. This commission makes use of the "Original Cost" basis for valuation of utilities for the determination of rates and security issues and expects the utilities to keep a continuous inventory of their plant and equipment. The so-called "Straight-Line" method of determining depreciation reserves is universally adopted in contrast to the "Sinking-Fund" system in use in some states. A very complete record of the capitalization, subdivided into the various classes of bonds and stocks, together with the invested valuation of all the utilities regulated, is maintained by the accounting department. In this record are also filed the docket number, date of order and amount of additional securities applied for and approved by the commission from time to time. The specific purpose of the issue is also recorded. This record is found to be of great practical value as each new application for increased capitalization is presented for consideration.

In this connection particular interest attaches to the accompanying curves, which probably represent the most complete financial records of the street railways of any



RISING COSTS ARE CLEARLY INDICATED BY THESE LONG TIME RECORDS OF MASSACHUSETTS STREET RAILWAYS

NOTE.—"Capitalization" in this chart signifies amount of capital stock outstanding.

state in existence. Beginning in the year 1856, with the few small street railways in existence at that time and extending through the period of extensive electric railway installations in the nineties, the curves show the variations in bonded indebtedness, capital stock, investments, operating ratio, etc., up to and including the year 1919. The convergence of the curves in the later years, indicating the relatively increased amount of the indebtedness in proportion to stock issues, is particularly striking.

HOW DEPARTMENTS ARE CONDUCTED

In the engineering department an interesting arrangement is noted, as a result of legislative enactment, to the effect that the engineer in charge, Henry W. Hayes, devotes a portion of his time to the work of the Attorney-General of the state, particularly in connection with investigations and hearings upon grade-crossing elimination problems. This work has been relatively light, however, during the last few years. This department checks estimates upon needed improvements requested by the utilities and after the installation has been completed the work is inspected and the expenditures and values approved for the accounting department. The street railways cannot begin new bridge and signal construction until plans and specifications have been approved by this department. The steam railroads submit plans but do not necessarily wait for approval. In both instances the finished structure must be inspected and approved before being put into service.

The other divisions of the Department of Utilities are not unlike those of other commissions, although their organization is at present in a state of transition because of the recent amalgamation of the two commissions into the Department of Utilities. The elimination of the largest electric railway system of the state from the commission regulation, involving more direct control by the state and the taxation of communities served to make up operating deficits, represents a departure which will be followed closely by all interested in public utility control. It seems to be a compromise between commission regulation, as understood at present, and government ownership. It has the advantage over the latter procedure in that the burden falls directly upon the communities served where the reaction is likely to be immediate, rather than in the form of a general tax upon the state or federal government. It may be that Massachusetts has again established a valuable precedent which will lead the way to new and more equitable solutions of the railway and other utility problems.

[NOTE.—Previous articles portraying the "behind the scenes" activity of commissions have appeared Dec. 30, 1916, page 1328, and Feb. 3, 1917, page 196, covering the Public Service Commission of New York, Second District, and Nov. 13, 1920, page 100, covering the Public Service Commission of New York, First District. —EDITORS.]

At more than forty of the busiest traffic points in London, England, "fogmen" are employed by the London General Omnibus Company to pilot buses across the street during foggy weather. These men are stationed at specified points equipped with powerful lamps. When a bus arrives at their point they hail the driver and then cross the street a few yards in front of the bus. By the introduction of this system confusion and delay in foggy weather is reduced to a minimum.

Training Motormen for Limited Runs

Very High Speeds on Chicago, North Shore & Milwaukee Involve Exceptional Responsibility, Requiring Special Training of Men

THE Chicago, North Shore & Milwaukee Railroad operates limited trains hourly each way between Milwaukee and Chicago at very high rate of speed. While this high-speed service is very popular and has attracted a considerable patronage to the road, the operating officials are very much alert to the dangers which accompany such service and they are consequently taking exceptional caution in the selection and training of men and in surrounding the service with safeguards in every other respect.

In the selection of motormen for these limited runs, M. J. Feron, general superintendent, requires as a preliminary training that these men shall have worked as motormen on the local passenger service of the North Shore Line for at least six months prior to receiving any consideration for an assignment on a limited car. Only the best men are given an opportunity to try out for these runs. If accepted for trial, they are required to run on the limited cars for a period of thirty days, during which time they are under constant attendance and instruction. If approved at the end of this period by the instructor, they are then subjected to questioning by the local superintendent, the superintendent of transportation on the North Shore Line, and are then finally sent to Chicago to Mr. Feron, who passes finally upon them. He puts the candidate through a rigid examination and if the latter cannot answer questions to the entire satisfaction of Mr. Feron he is rejected and has no further opportunity to qualify for the position.

These limited runs are considered the best jobs the company has, and they are much sought after. The men get nine hours' pay for the seven hours' work required to make one round trip between Chicago and Milwaukee. With this short working period, the men should always be fresh and any negligence from overwork impossible.

On last Labor Day a limited train was run every twenty minutes each way for ten hours, in addition to the heavy local service. Despite the short headway involved, everything went along smoothly all day until about 8 o'clock in the evening, when an especially heavy fog settled over the whole north shore. Officials were naturally much concerned and took great precautions to guard against the danger of the short headway. Limited trains were required to call the dispatcher at each stop and were not permitted to proceed to the next station until the train ahead had reported there. The motormen were not informed of this blocking of trains by stations, but were cautioned by the dispatcher upon each call to use the utmost care. These precautions of course made trains a little late, but the situation was handled with absolute safety.

Another practice followed which has contributed materially to the no-accident record of the company for the present season is that on Sundays every grade crossing on the line is provided with a watchman. Trackmen are used to fill in for the roads not usually protected, and this expense is considered very worth while, for the automobile traffic on the north shore on Sundays is very heavy, and the high speed of the trains makes special safety measures advisable.

Getting the Utmost Out of the Cars

A Dialogue Arising Out of an Overcrowded Condition of the Cars and Bringing Out the Points Involved in Scientifically Determining Whether More Cars Are Needed, How Many and What Kind

BY E. A. W.

THE SCENE is laid in the executive office of any medium or large sized street railway company. The dramatis personæ are a general manager and the superintendent of transportation. The plot opens something like this:

G. M. "Jim, are you putting everything that can roll out on the streets during rush hours these days?"

S. T. "Chief, we surely are. I'm even robbing the shops of overhauls and painting jobs. We need cars and need them badly."

G. M. "How much additional equipment could you use to advantage and on what lines?"

S. T. "We need 100 additional cars and 150 if you'll let me retire to the 'boneyard' the 39-footers with two-motor equipment."

G. M. "You've carefully checked your requirements and 100 is the least number it is possible to get along with?"

S. T. "Don't put it so strong, Chief. We are *getting along now*. But the lost fares, passed up passengers, packed cars, and continual growl from our patrons can only be relieved by putting 100 more cars on the road."

G. M. "This estimate of yours no doubt has been carefully checked; but, Jim, have you tried to get better use of our present equipment by means of turn-backs on long-haul, sparsely settled lines, increasing schedule speeds through careful time-point studies of each line, reduction of overhauling and painting time, use of skip-stops, rerouting, etc., etc?"

HE GAVE THOSE POINTS SOME CONSIDERATION

S. T. "Well, we have given those points some consideration, but of course this matter is so involved we have only hit the high spots. My thirty years' experience handling traffic tells me that more cars are needed, and these other matters, if studied, will only reduce the number slightly, if at all. Think of the expense and time involved in making such a study."

G. M. "But, Jim, purchasing 100 cars today is a costly matter. Not only has the price of equipment doubled, but we shall need additional car house and shop facilities and substation and generating capacity, all of which means heavy investment with our paper selling for about half what it did before the war."

S. T. "I know, Chief; but think of the increased earnings 100 more cars would bring in."

G. M. "I'm not so sure, Jim. We are handling most of the riders now, perhaps losing some. More cars and facilities mean a heavy increase in operating and fixed charges. You haven't told me the type of car we ought to buy."

S. T. "Why not get the same type as our present standard?"

G. M. "Have you thought of the safety car?"

S. T. "Well, some; but frankly I can't see it for our service. They are probably good in other places, but our conditions are different."

G. M. "The old story, Jim. By the way, do you think I have enough facts and information to go before my board of directors and get a million for new cars and what goes with them? If you had to go good for the million, Jim, would you feel that we had gone into this matter as thoroughly as we should?"

S. T. (faltering). "No, but—the time required to make— Oh, hell, Chief, we ought to step carefully. A million dollars! I never thought about it just this way. I'll tell you what I'll do. Give me two days to mull this over and I'll try to draw up a program which will give you a real basis on which to go after the new cars that we need."

G. M. "Go to it!"

JIM BEGINS TO STUDY

As a preliminary to his study of requirements, the S. T. began to jot down the various things to be considered in arriving at a sound basis of conclusion and was astonished to find how many things had a bearing on his problem. Several days later he sat down with the G. M. and went over an outline something like the following, desiring support for his plan of study before undertaking to carry it out.

POINTS TO BE CONSIDERED IN A STUDY OF TRAFFIC AND ROLLING STOCK CONDITIONS AND FORECAST.

I. *Historical Outline of the Development of Rolling Stock, Including Present Types.*
  A. Present equipment.
    1. List of present equipment,
    2. Complete set of typical drawings,
    3. Brief history of each of the present types of cars.
  B. Advantages to be gained from use of modern types of equipment.
    1. Birney type one-man safety cars.
    2. Peter Witt pay-pass cars.
    3. Center entrance stepless cars.
    4. Near-side-stop cars.
  C. Discussion and advantages of various fare collection methods.
    1. Collection by passing through the car.
    2. Pay-as-you-enter.
    3. Pay-pass.
    4. Prepayment area.
    5. Use of metal tokens.

G. M. "What's the idea of working up data on fare collection methods?"

S. T. "You'll see later on. We ought to get our ideas on the table, and when we discuss increasing schedule speeds we will select the method productive of best results."

G. M. "All right, let's go on."

S. T. "In considering this matter we have available several very complete reports and recent checks. I don't think we need to go into a long detailed traffic study now as that would take too much time. We can make fairly accurate deductions from data at hand or that can soon be obtained. But we ought to cover the points in Section II pretty well in order intelligently to forecast the future.

II. *Growth of Traffic and Predictions for the Future, Showing the Necessity for Increased Service.*

- A. Natural growth of city.
  - 1. In population.
  - 2. In territory.
    - a. Comparison with other cities.
    - b. Study of pin maps showing locations of buildings and car lines; also on the same map public and private garages are separately designated.
    - c. Maps locating points of 25, 50 and 75 per cent of street car travel on each line.
    - d. Discussion.
- B. Influence of the automobile.
  - 1. On average load.
  - 2. On peak loads.
  - 3. On seasonal fluctuations.
  - 4. On schedule speeds.
- C. Transfer privilege.
  - Restriction of extension.
- D. Traffic studies.
  - 1. Number of passengers on each line, rush hour, peak load points.
  - 2. Frequency of service required, expressed in seats.
  - 3. Average length of standing rides during the rush hour.
  - 4. Location of turn-back points.
    - a. Downtown—To get crowds now passed up by cars on various routes outside most central congested point.
    - b. Outlying points.
  - 5. Frequency of service during rush hours necessary beyond turn-back points.
- E. Necessity of uniformity in service to keep diversity factor low.

G. M. "Why do you indicate garages on the map and make a distinction between those for public and those for private use?"

S. T. "It seems to me that in a town the size of ours the number of garages in a section gives a direct indication of the travel to be expected from that section. Moreover, the increase in the number of garages should be a gage of the effect automobiles are having on street railway travel. The reason for designating between public and private garages is to show the great increase in this class of commercial business. It is logical to assume that a private garage back of a residence would have only one car, but a large public garage might have several hundred, and the rapidity with which these are being built deserves as careful attention on the part of the street railway manager as any other thing that might affect his business."

G. M. "Now explain what you mean by keeping diversity factor low, Jim?"

S. T. "There are present in the travel characteristics of every line certain periods of time during rush hours when an accumulation of passengers for that line is more rapid than ordinarily. These momentary peaks may affect one or possibly two trips only. However, if they occur regularly their identity should be established, recognized and provided for. It is this fact that makes it necessary to have uniform service so that Mr. Doolittle's diversity factor or ratio of maximum loaded car to the average car load will be low. Mr. Doolittle was pleased to term this ratio 'diversity factor' as it is the measure of the diversity between carloads for different times of the day. If these points are clear I would like to present to you an outline of the methods which we can follow to get more use from our present facilities. I have grouped these under Section III."

III. *Discussion of Means of Increasing Service.*

1. Increasing schedule speeds. Results to be obtained from hypothetical speeds.
2. By reducing the excess car-miles, due to dead cars going to or from carhouses, or excess service on the outer ends of long lines.
3. By the purchase of additional rolling stock.
4. Justification of increase in service from the standpoint of net returns from added service. Increase in riding habit to be expected from an increase in service. This would cover possibilities of short haul riders on present routes where considerable walking is apparent. This matter might well include a consideration of the use of present equipment under one-man operation between rush hours.
5. Saving in time of cars out of service due to pull-ins, inspection, overhauling, painting, etc., by reducing time now required to accomplish such work.
6. Additional trackage on present single track lines, either as double track or closed sidings.

S. T. "Some of these points involve so many important things that I have detailed them more particularly. In line with your thought about getting better use of our facilities this is a most important subject. Most of the information needed is available and requires editing and slight revision to make it useful in this study."

IV. *Increasing Schedule Speeds.*

- A. Theory.
  - 1. Rate of acceleration and braking.
  - 2. Number of stops and slowdowns.
  - 3. Skip-stops. (Find the proper place on each line outside of a central zone where skip-stop operation should be commenced.)
  - 4. Density of traffic and its proper regulation.
  - 5. Rerouting.
  - 6. Rapidity in boarding and alighting.
  - 7. Pay-enter and pay-leave on safety cars.
  - 8. Condition of track and overhead.
  - 9. Supervision,
    - a. Use of headway recorders,
    - b. Use of peak load checks,
    - c. Use of traffic charts,
    - d. Office study of traffic records,
    - e. Use of facilities by track department in street work that will reduce delays such as track trucks, portable cross-overs, oxyacetylene and electric welders.
  - 10. Power distribution and return system.
  - 11. Trainmen's efficiency.
    - a. Training car men.
    - b. Follow up on knowledge of rules.
    - c. Follow-up on coasting.
    - d. Stationing inspectors at centers of congestion.
    - e. Collection of fare and distribution of transfers.
      - Increasing the use of metal tokens.
      - Pay-pass possibilities.
  - 12. Prepayment areas.
- B. Discussion of each line in accordance with the above.

G. M. "I notice you have covered certain items under 'increasing schedule speeds,' the importance of which I fail to grasp. For example, what do you mean by the item 'condition of track and overhead'?"

S. T. "Since we have been paying such enormous prices for materials and labor, we have been forced to defer certain maintenance work. We have some sections of track that need repairs, so we have to make allowance in our schedule speeds for this bad condition. The same applies to the overhead, although in this case it is more a lack of copper than any physical condition that affects us."

G. M. "How about the item 'power distribution and return system'?"

S. T. "We intend to cover our power situation more fully than this report contemplates, but certain sections are overloaded and cause so serious a drop in voltage that during rush hours it slows up car speeds materially. We intend to cover this point for each line.

"If you are through with the schedule speed matters, let's look at the next division of the outline."

V. *Reduction of Unused Car Mileage.*

- A. Theory.
  - 1. Effect on increased use of cars by proposed turn-backs.
  - 2. Decreasing dead trailer mileage and dead extra car mileage.
- B. Discussion of each line.

S. T. "Our system developed without much plan—as you are aware. As we increased the number of our cars sometimes we failed to increase our carhouse facilities. As a result, we have cars housed at considerable distances from the lines over which they operate. This results in considerable dead mileage each day, so we thought some reassignments could be worked out that would reduce dead mileage expense."

G. M. "Now we come to the heavy part, I see: 'purchase of new rolling stock'."

VI. *Purchase of New Rolling Stock.*

- A. New cars needed if all present equipment remains in service. This would be the minimum requirement and sufficient only for our growing needs.
- B. New cars needed assuming the retirement of certain equipment now obsolete or rapidly becoming so.
- C. Extra equipment required if carhouse work is done in the day time instead of nights.
- D. Extra equipment needed if the carhouse work is done at night and each car is put in the same run daily, thereby getting the same motorman.
- E. Discussion of each line, showing the number of new cars and types necessary for each.
- F. Use of auto buses.
  - a. As feeders from outlying districts needing transportation between car line and such district.
  - b. To supplement car service taking care of close-in short-haul business.
  - c. To run on regular routes over streets downtown, and in outlying districts not having street car facilities.
- G. Kind and number of new equipment to buy:
  - a. One-man safety cars.
  - b. Peter Witt motor cars,
  - c. Peter Witt trailers.

G. M. "I can't find much fault with your detail. When you have it worked out we ought to know fairly accurately what we will have to buy and what results we can expect; and I can see now the reason for the detail that precedes this 'purchase of new rolling stock' section. You have done a good job; is there any more to it?"

S. T. "Why, Chief, you wanted the whole story for your board of directors, and I've only got started. We have the most important matter of all ahead of us—costs. But before we come to that I believe we can do some remodeling as suggested here":

VII. *Remodeling Present Rolling Stock.*

We may be able to do much in this direction. We are hauling trailers over grades with two-motor cars with a serious slowing up of service. Considerable economy may be realized by instituting changes covered in the following items—enough to warrant consideration of them in this study:

- A. Abandonment of 39-ft. two-motor cars and utilization of motors under these cars to make four-motor cars out of certain other two-motor cars, at present unable to haul trailers.
- B. Remotoring four-motor cars at present equipped with GE-58 motors with modern light-weight motors.
- C. Rebuilding center-entrance type bodies for pay-pass collection and operation by one man before and after rush hours.
- D. Possibilities of reduction in weight of present equipment.
  - 1. Nature of changes.
  - 2. Saving in power.
  - 3. Increase in schedule speed.
    - a. Loading time,
    - b. Acceleration and braking,
    - c. Running time.
  - 4. Decreasing number of step accidents.
- E. Use of helical gears instead of spur gears.
  - 1. Saving in power.
  - 2. Reduction of noise.
  - 3. Reduction of motor trouble, from vibration.

VIII. *Other Facilities Rendered Necessary.*

- A. Mechanical department facilities and methods.
  - 1. Divorcing division repair work from general shops.
  - 2. Night work vs. day work at carhouses and placing each car on same run. Advantages and disadvantages.
  - 3. Daylight work.
    - a. Truck shop.
    - b. Machine shop.
    - c. Blacksmith shop.
    - d. Armature shop.
    - e. Wood shop.
    - f. Paint shop.
    - g. Carhouses.
    - h. Résumé.
- B. Power department changes and additions needed.
  - 1. Generating equipment.
  - 2. Converting equipment.
  - 3. Transmission and distribution system.
- C. Track betterments needed; discussion of each line.
- D. Overhead and bonding; discussion of each line.
- E. Increase in storeroom facilities to accommodate increase in stock of parts for new equipment.

IX. *Cost of Providing Additional Service.*

S. T. "Now we come to costs, and in the following we have attempted to cover this subject in a general way; the detailed estimates will be on file in the engineering department. I am forced to confess that when we first talked this matter over, I did not have any idea that it involved so many ramifications and the vitals of so many departments. But I can see now that all these things must be taken into account.

- A. Purchase of additional rolling stock.
- B. Remodeling present rolling stock.
- C. Changes in mechanical department and carhouses.
- D. Power equipment.
- E. Special work for turn-backs.
- F. Track renewals and betterments.
- G. Overhead and bonding.
- H. Storeroom and yard facilities.
- I. Summary.

X. *Financial Aspects.*

- A. Additional revenue possible from increased and bettered service.
- B. Investment required, divided between construction and maintenance.
- C. Effect of operating costs of—
  - 1. Decreased power,
  - 2. Decreased maintenance of cars and track,
  - 3. Decreased accidents,
  - 4. Increased car-hours and car-trips,
  - 5. Added fixed charges due to increasing capital investment.
  - 6. Decreased labor due to one-man operation,
    - a. Safety cars.
    - b. Existing equipment.

D. Source of funds.
  1. From revenue.
  2. From capital.

S. T. "Under this section we aimed to summarize the apparent conclusions that a careful reading and study of the foregoing would make manifest, taking into consideration the operating, construction and financial features jointly, and thereby arriving at a proper and feasible solution and program."

XI. *Summary, Conclusions and Recommendations.*

A. New equipment.
B. Changes in existing equipment.
C. Shops and carhouses.
D. Power.
E. Track, overhead and bonding.
F. Training methods and type of men to be selected for safety car operation.
G. Lines best suited to safety car operation and suggested schedules and spacing.
H. Lines on which present equipment changed to one-man safety type can be operated before and after the rush hours and the savings resulting therefrom.

XII. *Suggested Program. Rate at which various steps can be carried out.*

G. M. "This matter is of course regulated by the financial ability of the company to secure funds to carry out the work, also by the physical limitations imposed by organization, purchasing, deliveries, and carrying out the adopted changes under operation, and educating the public to the changes involved."

S. T. "You are right. We will include in the report a program of carrying out the work also, so that your board, when once it has authorized the funds for this purpose, won't expect the job done two days later. We will have a lot to do and it can't be done 'yesterday' or even in a week."

G. M. "Well, Jim, if you have missed anything, it isn't important. Frankly, I, too, little realized what a real study to get better use of our facilities would lead us into. Get busy and compile the data and I'll use my most persuasive arts with that hard-headed but human and likable old board of mine."

The Electric Railway Budget

Boston Elevated Finds Monthly Revision of Estimates Necessary—The Budget Serves Several Useful Purposes

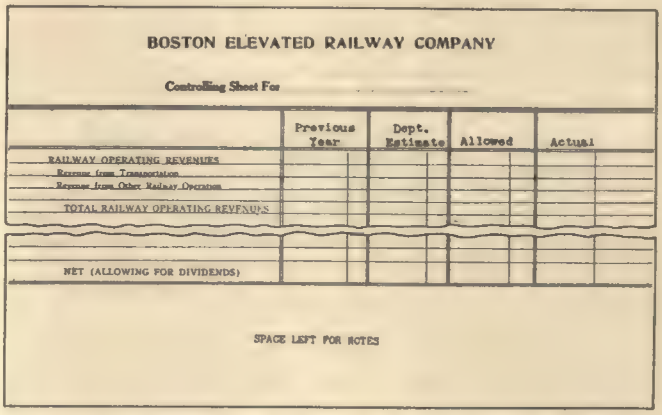
By E. M. FLINT
Assistant to the General Manager Boston Elevated Railway

As we read the criticisms of extravagant expenditures by the national government and the necessity for the adoption of an adequate budget system to insure that government departments shall be conducted on a business-like basis we are increasingly convinced that a budget system is the backbone of all successful business enterprises. Yet it is surprising that few details of such systems are available, especially as applied to the street railway industry. That such a system has been adopted by some street railway companies with satisfactory results is indicated by the statements to that effect in their annual reports. There is no doubt that a budget system, perfected to meet the requirements of the particular industry, is helpful in enabling an executive to plan ahead and keep a definite check on the expenditure of money.

The system in use by the Boston Elevated Railway, which is described in this article, differs from other systems which are known to the writer in that instead of being confined to an annual budget it is made more flexible by having in addition to the annual budget a monthly budget also. It has been found to be practically impossible to anticipate a year in advance all of the difficulties with which the company will have to contend throughout the year, necessitating changes in the program determined upon when the annual budget was prepared. For instance, it is not possible to ascertain to what extent expenditures must be incurred for track work in connection with the reconstruction of streets by municipal authorities, nor is it possible accurately to estimate a year in advance the cost of snow removal. Earnings, which are the basis of the budget, are materially affected by unforeseen weather conditions. If, however, the annual budget is used for a guide, and monthly budgets are prepared also, the system becomes much more flexible. Many of the difficulties suggested can be anticipated reasonably well in advance and can be provided for in the monthly budget by the postponement of less important work.

The printed forms which are used by the Boston Elevated follow the Interstate Commerce Commission method of accounting. This makes it possible to check with the auditing department the expenditures under any account number and to avoid conflicting statements.

The summary sheet, as reproduced in part, and the other forms, represented by the sample reproduced on the opposite page, show the amounts each department is authorized to spend, subdivided by the various account numbers.



BOSTON ELEVATED RAILWAY COMPANY

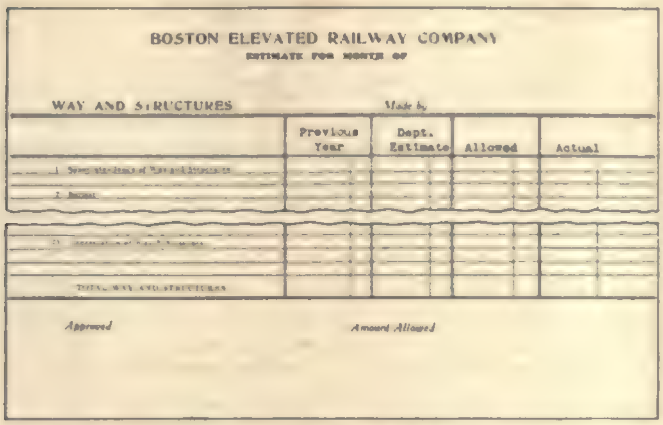
Controlling Sheet For

	Previous Year	Dept. Estimate	Allowed	Actual
RAILWAY OPERATING REVENUES				
Revenue from Transportation				
Revenue from Other Railway Operation				
TOTAL RAILWAY OPERATING REVENUES				
NET (ALLOWING FOR DIVIDENDS)				

SPACE LEFT FOR NOTES

FORM "A," USED FOR GENERAL SUMMARY OF BUDGET
(Actual size of this and other budget sheets 8½ x 14 in.)

The annual budget is prepared after each department head has made a careful survey and has presented a written report with estimates covering the requirements of his department for the year. The reports are discussed at meetings of department heads and less important work eliminated to meet the estimate of money available for operating and maintenance requirements.



BOSTON ELEVATED RAILWAY COMPANY
ESTIMATE FOR MONTH OF

WAY AND STRUCTURES Made by

	Previous Year	Dept. Estimate	Allowed	Actual

Approved Amount Allowed

FORM WHICH IS USED FOR ITEMIZED DEPARTMENTAL BUDGETS

When the program for the year is determined upon, estimated expenditures are distributed to account numbers on the budget forms. This is done on the detail sheets by the respective departments and submitted to the general manager's office, where they are summarized on form "A."

The complete list of items appearing on form "A" is as follows:

RAILWAY OPERATING REVENUES
Revenue from transportation
Revenue from other railway operation
TOTAL RAILWAY OPERATING REVENUES
RAILWAY OPERATING EXPENSES
Way and structures
Equipment
Power
Conducting transportation
Traffic
General and miscellaneous
TOTAL RAILWAY OPERATING EXPENSES
Per cent of operating expenses to operating revenues
Net revenue—railway operations

TAXES ASSIGNABLE TO RAILWAY OPERATION
Operating income
NON-OPERATING INCOME
Gross income
DEDUCTIONS FROM GROSS INCOME
Rent for leased roads
W. E. St. Ry. Co.
W. E. St. Ry. Co. Tremont subway
Other roads
Total rent for leased roads
Miscellaneous rents (other subway tunnels)
Interest on funded debt (B. E.)
Interest on unfunded debt (Notes)
Miscellaneous deductions

TOTAL DEDUCTIONS FROM GROSS INCOME
NET INCOME
DIVIDENDS (at 5 per cent on common and 7 per cent on preferred)
NET
(Allowing for Dividends)

The items which appear on the five general budget forms, devoted respectively to way and structures, equipment, power, conducting transportation and general and miscellaneous, are as follows:

WAY AND STRUCTURES

1. Superintendence of way and structures.
2. Ballast.
3. Ties.
4. Rails.
5. Rail fastenings and joints.
6. Special work.
8. Track and roadway labor.
9. Miscellaneous track and roadway expenses.
10. Paving.
11. Cleaning and sanding track.

12. Removal of snow and ice.
13. Tunnels and subways.
14. Structure and foundations.
15. Bridges, trestles and culverts.
16. Crossings, fences and signs.

17. Signal and interlocking apparatus.
18. Telephone and telegraph lines.

19. Other miscellaneous way expenses.
20. Poles and fixtures.
21. Underground conduits.
22. Distribution system.
23. Miscellaneous electric line expenses.
24. Maintenance of buildings, fixtures and grounds.
25. Depreciation of way and structures.

EQUIPMENT

29. Superintendence of equipment.
30. Passenger and combination cars.
31. Freight, express and mail cars.
32. Service cars.
33. Electric equipment of cars.

36. Shop equipment.
37. Miscellaneous shop expenses.

38. Vehicles and horses.
39. Miscellaneous equipment expenses.
40. Depreciation of equipment.
41. Equipment retired.

POWER

45. Superintendence of power.
46. Power plant buildings, fixtures and grounds.
47. Power-plant equipment.
48. Substation equipment.
49. Transmission system.

50. Depreciation of power-plant buildings and equipment.
52. Power-plant employees.
53. Fuel for power.
54. Water for power.
55. Lubricants for power.
56. Miscellaneous supplies and expenses of power plants.
57. Substation employees.
58. Substation supplies and expenses.
59. Power purchased.
60. Power exchanged.
61. Power transferred, Cr.

CONDUCTING TRANSPORTATION

63. Superintendence of transportation.
64. Passenger conductors, motormen and trainmen.
65. Freight conductors and motormen.
66. Miscellaneous car-service employees.
67. Miscellaneous car-service expenses.
68. Station employees.
69. Station expenses.
70. Carhouse employees.
71. Carhouse expenses.
72. Operation of signal and interlocking apparatus.
73. Operation of electric and telephone lines.

78. Other transportation expenses.

TRAFFIC

79. Superintendence of solicitation.
80. Advertising.
82. Miscellaneous traffic expenses.

GENERAL AND MISCELLANEOUS

83. Salaries and expenses of general officers.
84. Salaries and expenses of general office clerks.

85. General office supplies and expenses.
86. Law expenses.
87. Relief department expenses.
88. Pensions and gratuities.

89. Miscellaneous general expenses.
92. Injuries and damages.
93. Insurance.
94. Stationery and printing.
95. Store expenses.
96. Garage and stable expenses.
97. Rent of tracks and facilities.
98. Rent of equipment.

Departments are required to keep a close check on all their expenditures and to know approximately the amounts of money spent from their allowances at all times. This is not difficult, because the budget forms adhere to the Interstate Commerce Commission method of accounting used by the company.

With a statement before him, at weekly meetings of department heads, showing the daily and accumulated earnings each month, and the percentage of increase as compared with the estimates used in the budget, the general manager has fairly accurate continuous information as to whether or not the expenditures allowed by the monthly budget are likely to exceed the earnings and can take such action as may be necessary to avoid it.

Furthermore, the budget system tends to promote the closest kind of co-operation and to insure that every dollar is being spent where it will do the most good. Department heads are enthusiastic supporters of the budget because it enables them to plan ahead and to know definitely the amount of money at their disposal.

The clerical work required under this plan is negligible compared with the results obtained. As a matter of fact the budget superseded a miscellaneous assortment of statements intended to accomplish the same purpose, without any increase in the clerical force, and established a uniform method of accounting.

Since it is essential that full value be received for every dollar spent the budget, to those who have had experience with it, seems absolutely necessary.

Skip-Stop Still Used

Statistics from Seventeen Street Railway Companies Which Have Continued It, Giving Data on Its Use

CLEVELAND has the honor of being the first city to institute the skip-stop on a considerable scale. This system was introduced in 1912 by Peter Witt, but little was done until the war, when the necessity for conservation in energy and fuel, the impossibility of increasing rolling stock and the added congestion on the streets due to the heavy industrial and vehicular traffic so interfered with the schedules and operation of railway companies that the skip-stop obtained a prominent place in railway operation.

To determine the present status of the skip-stop, the American Electric Railway Association has recently issued a data sheet which furnishes some very interesting information. Of forty large street railway companies using the skip-stop during the war, seventeen companies have continued it. Six of these companies have increased the use of the skip-stop on their systems, five have decreased it and six have made no change in its installation since the war. Sixteen of these companies use the skip-stop in regular service.

DISTANCE BETWEEN STOPS

The general principle in arranging stops seems to be to equalize the spacing, but in some cases a different spacing is used for the congested districts and city traffic from that used in the suburban districts. The stops used by most companies in the cities vary from 600 to 700 ft., the general average being about eight to the mile. In suburban districts three or four companies have a distance between stops of about 850 ft. and one reports 1,000 ft.

One of the great features of the skip-stop is the fact that it makes possible an increased scheduled speed. The percentage increase of the companies reporting varies from 7 per cent to 24.4 per cent, with an average figure of about 17½ per cent. An average figure for speed without skip-stops seems to be 8.5 miles per hour, and the use of skip-stops makes possible a speed of 9.5 miles per hour. However, in connection with these speed figures it must not be forgotten that the increased use of safety cars has had some effect on the figures. The decrease in power consumption per car-mile because of the use of the skip-stop varies from 4½ to 10 per cent, an average figure being about 5½ per cent. With skip-stops the power consumption on an average is about 2.5 kw.-hr. per car-mile, while without skip-stops under the same conditions the power consumption would be about 3 kw.-hr. per car-mile. But again in considering these figures, it must not be forgotten that during the war the platform men and the operators on the street car were measurably less efficient than those now operating on the different systems.

In discussing the advantages of the skip-stop, thirty-seven individual companies reported various advantages for skip-stops, briefly outlined as follows: Increased speed, less power, better service at less cost, better regulation of service, saving in equipment, more comfort in riding, due to fewer stops and faster speeds; reduction of accidents, reduction in time schedule without increasing car speeds, giving more rapid service, equalizing the distances between stops makes possible additional trips without increasing the number of cars, gives more regular service, eliminates congestion, which makes possible more regular headways; saves maintenance of brake shoes.

In discussing the disadvantages of the skip-stops, thirty-five individual companies reported, and twelve of the thirty-five said they could see no disadvantages whatsoever in the use of the skip-stop. Others alleged the following: Lack of incentive for short distance riders, opposition of public opinion, increases the use of automobiles and jitneys, the owners of corner property object, inexperienced and new operators confuse stops and thus irritate passengers, inconveniences the passengers because they have to walk to the stops, strangers in the city do not understand the system, in small cities where the cars operate on a ten or fifteen-minute headway the skip-stops encourage walking as the distances are short.

The seventeen street railway companies which are now using the skip-stop report that they contemplated retaining it as long as possible, as it has proved extremely valuable in the operation of their systems.

The companies now using the skip-stop mentioned in this tabulation are the following:

Capital Traction Company, Washington.
Chicago Surface Lines, Chicago, Ill.
Cleveland Railway, Cleveland, Ohio.
Detroit United Railway, Detroit, Mich.
Empire State Railroad Corporation, Syracuse, N. Y.
Houston Electric Company, Houston, Tex.
Indiana Service Corporation, Ft. Wayne, Ind.
International Railway, Buffalo, N. Y.
Kansas City Railways, Kansas City, Mo.
Milford & Uxbridge Street Railway, Milford, Mass.
Mobile Light & Railway Company, Mobile, Ala.
Northern Texas Traction Company, Fort Worth, Tex.
Omaha & Council Bluffs Railway, Omaha, Neb.
Ottawa Electric Railway, Ottawa, Ont.
Pacific Electric Railway, Los Angeles, Cal.
Toledo Railways & Light Company, Toledo, Ohio.
Washington Railway & Electric Company, Washington, D. C.

Water Power Valuations

IN A RECENT pamphlet Edward J. Cheney, engineer, 61 Broadway, New York, has digested the opinion of a large number of court and public service commissions with reference to the principles and methods used in arriving at the value of water rights in connection with different classes of cases which arise. On account of the similarity of the valuation of land to that of water rights, leading decisions with respect to land values have been included in instances where no cases on water rights were discovered.

Mr. Cheney summarizes the result of his study as follows:

> The courts approved, for all purposes, market value, determined as at private sale between a willing buyer and a willing seller after all circumstances and conditions have been considered. The commissions have a strong leaning toward market value determined in the same way, tempered somewhat by consideration of cost of promotion (if recently acquired), but with a general disposition to be liberal and to reward promoters for the effort and outlay. In rate cases there is some tendency toward vagueness and generality along the lines of Smyth vs. Ames (169 U. S., 466). There is also some sentiment for the sharing of benefits between owners and public, but no method has been outlined for carrying out this idea.

A new type of bus is to be put into operation in London which will seat fifty-seven passengers, as compared with forty-six passengers in the present large-capacity buses.

Norfolk's Traction Situation—III

Operating Conditions Considered—Fare Policy Is Outlined on a Flat Fare Basis—Rerouting Suggestions Are Made and Jitney Competition Is Shown to Be Detrimental to City's Best Interests

IN THE first two articles of this three-part series on the traction situation in Norfolk, Va., the recommendations of Messrs. Taylor and Cooke with reference to franchise provisions and the valuation for rate base were outlined. Their report also includes an analysis of the operating condition of the railway property and makes recommendations as to fare policy, how the net income may be increased, rerouting, jitney competition and certain rehabilitations which should be made.

ANALYSIS OF INCOME, EXPENSES AND FIXED CHARGES

Owing to an increase in the rate of fare during 1919 (5 cents to Oct. 1, 1919, and 6 cents thereafter), and to a wage increase in October and because expenditures for maintenance and renewal reserves were below normal during 1919, the actual accounts for that year showed an apparent surplus over fixed charges of $130,853. A careful analysis and adjustment of the accounts reveals that instead of a surplus there was actually a deficit of $157,939 after fixed charges. Actual and correct income statements follow in condensed form:

	Actual Year to Apr. 30, 1920	Corrected Year to Apr. 30, 1920
Gross revenue	$1,935,978	$2,119,269
Maintenance—track and roadway	162,000	168,000
Renewal reserves	....	316,408
Maintenance—overhead,	56,642	57,222
Buildings	8,208	8,208
Care of equipment and shop expense	191,449	194,249
Power	154,185	163,347
Wages—M. & C.	452,292	510,292
Other operations of cars	157,796	162,142
Damages and legal expenses	121,607	132,607
General administration	83,014	85,064
	$1,387,294	$1,798,291
Operating income	548,684	320,978
Taxes	86,493	114,583
Fixed charges	331,338	365,334
Surplus after fixed charges	$130,853	(a) $157,939

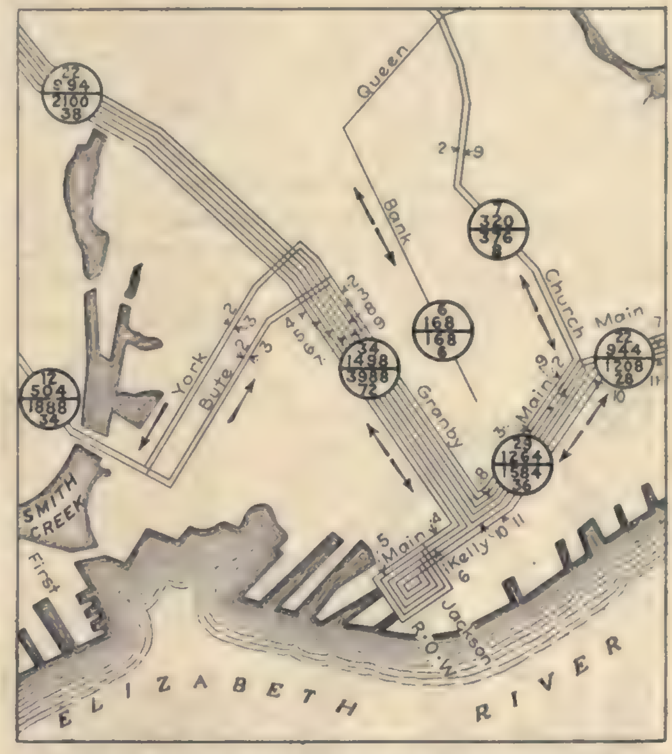
Total annual deficiency below 8 per cent on $8,750,000 valuation $492,605

(a) Deficit.

STUDY OF PROFITS AND LOSSES BY LINES AND ZONES

An allocation of all revenues and expenses (both actual and corrected) was made by lines and by fare zones based upon analysis of all items of expense with respect to the unit of property or service with which they vary or to which they may be considered as chargeable for allocation purposes. The results are summarized in the following table:

	Upon Basis of Actual Expenditures, Year Ending April 30, 1920.		Upon Basis of Actual Expenditures Corrected to Give True Cost.	
	Deficit After Paying Fixed Charges	Surplus After Paying Fixed Charges	Deficit After Paying Fixed Charges	Surplus After Paying Fixed Charges
Zone No. 1	$40,146	$199,715	$150,924	$16,468
Net surplus or deficit	.	159,569	134,456	....
Zone No. 2	73,813	54,141	85,916	73,900
Net surplus or deficit	19,672	. . . .	12,016	
Zone No. 3	9,045	......	11,367	......
Net surplus or deficit	9,045	. . .	11,367	......
Total, all zones	$123,003	$253,856	$248,207	$90,368
Net surplus or deficit	. . . . .	130,853	157,839	......



ROUTING OF CARS, WITH NUMBERS OF CARS AND SEATS, BEFORE REROUTING PLANS WERE SUGGESTED

The foregoing study reveals that 85.2 per cent of the deficit from all zones is ascribable to operations in the first zone, which corresponds substantially to the area within the city limits. With reference to the cost differentials involved, the report says:

> The large loss chargeable to city, as compared with county service, is due principally to the fact that the cost of maintenance and renewal reserve per mile of track in paved city streets is about 3.4 times as great as maintenance and renewals per mile of open track on county lines operating mostly on private right of way. Expressed upon a total money basis, the cost of maintenance and renewal reserves for 67.2 miles of city track with overhead lines amounts to $467,515, while cost of similar work and reserves on 35.4 miles of county track (more than half of city track distance), amounts only to $74,867.
>
> Another important cause of increased cost of service within city, as compared with county districts, is the low speed at which cars must be operated in built up sections. Car speeds average 7.7 and 12.3 m.p.h. in city and county respectively. Wages of motormen and conductors amount to 11.7 cents per car-mile of service within city limits and 7.3 cents per car-mile on county lines outside of city. In other words the average car-mile operated in Norfolk city streets consumes 7.8 minutes and costs on the average 60 per cent more for platform wages than does the car-mile operated on county lines, which consumes only 4.88 minutes.

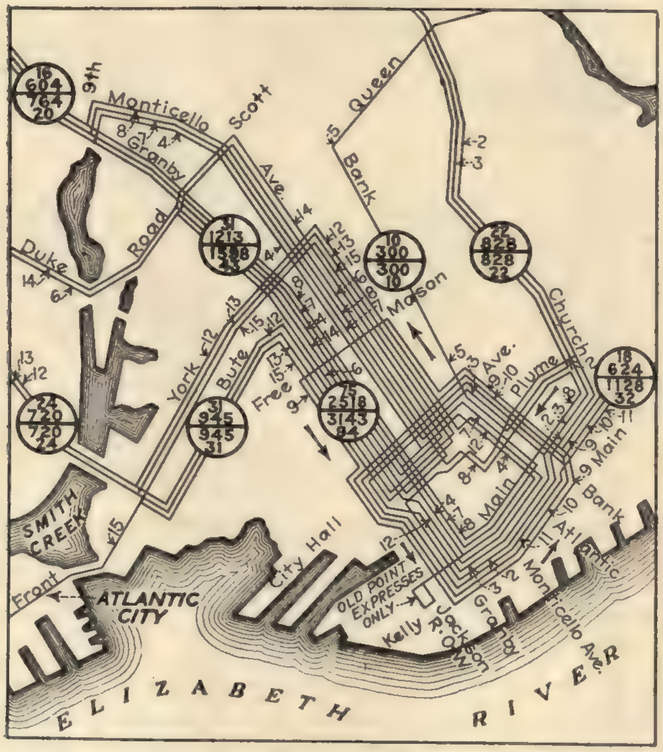
With reference to Zones 2 and 3, which are substantially outside the city limits, the report emphasizes the unprofitable result of wide seasonal variations in traffic, requiring maintenance of idle equipment nine months for service during three months of the year. The effect of this and of low average traffic density on outlying lines as compared with city lines is reflected in the following tabulation of fixed charges per car-mile and per car-hour.

	Fixed Charges per Car-Mile Cents	Fixed Charges per Car-Hour
Zone 1 — City	6	$0.46
Zone 2 — County	11	1.38
Zone 3 — County	17	2.09

As a result of the study made the conclusion was reached that additional revenue should be secured through introduction of an additional fare zone on county lines and that net income from operations within city limits should be increased by methods other than an increase in the basic 6-cent fare within the city, to which reference is made later.

FARES AND FARE POLICIES

It is pointed out that an 8-cent or 9-cent fare will be necessary to yield 8 per cent on the established valuation if present conditions are continued with respect to:



RECOMMENDED ROUTING, SHOWING APPLICATION OF ONE-WAY STREETS IN DELIVERY DISTRICT*

(1) Routing; (2) continued use of heavy two-man cars where one-man safety cars would be more economical; (3) jitney competition, which depletes railway earnings to the extent of about $350,000 per year; (4) burdensome franchise conditions, including unjust paving obligations, and diversion of revenue from sale of transfers to the city treasury; (5) abnormal maintenance due to the depleted condition of the property.

City Fares: No increase in city fares is recommended for the reason that while the company is entitled to charge rates which will yield a fair return, net income can be increased by specified economies in operations and by increasing traffic in part through extended and improved service. The proposed improvements and economies, however, are shown to be dependent upon municipal co-operation in the matter of franchise revision, traffic regulation, and the elimination of jitney competition. It is, however, made clear that it will be necessary to raise the city base fare if the specified program does not produce adequate net income.

The factors which should be considered in determining the proper form of such increase are discussed at length. With respect to this it is stated that while the form of increase is a matter of no concern to the company so long as it provides adequate revenues, it is of real importance from a civic standpoint. The position is taken that uniform fares with substantial transfer privileges encourages desirable development of the city unrestricted by unnatural barriers of fare differentials and provides equal opportunity for the population at large to enjoy the advantages of city parks, recreation centers and educational institutions maintained by general taxation. While widespread shifts of population would occur only after long continued operation under a zone fare system, it is considered that ultimately such a system is bound to show its effect in warping the areas of development into the districts of minimum transportation costs.

That conditions in American cities which have developed over wide areas upon the flat fare principle differ widely from those in foreign cities whose growth has occurred under zone fare systems is maintained by the manner in which this subject is treated. The analogy is drawn that if zone fares can be justified on the "cost of service" basis then rates for water, gas or electric service could with equal logic be increased in outlying districts on the ground that more facilities are required to reach them than to reach the districts adjacent to the source of supply. In the case of street railway service, the use of long haul facilities likewise carries with it the inconvenience of a long ride, which considered with other factors leads to the conclusion that from the passenger's standpoint the value of a long ride to him is no greater than the value of a shorter ride as he is buying a transportation service primarily, and not a length of ride.

The suitability of city zone fares is considered to depend largely upon the broad question of the "value of the service" to the passenger as measured by his own standards and cannot be justified upon the sole basis of theoretical "cost of service" per mile of ride.

The report argues at length on these points, suggesting a great deal which space does not permit treating at length. It holds that the flat uniform fare stimulates the riding habit because it encourages expansion of residential sections and thus broadens the market for the sale of transportation. The inference is that a demand for transportation is thus created, which is firm and durable as compared with that produced by fostering of short-haul traffic at the expense of general development of a company's transportation market considered as a whole.

Transfer Charge of 2 Cents Retained Temporarily: While as a policy free transfers are advocated, it was determined that 90 per cent of Norfolk's travel is to and from the business district. While the bulk of the 2-cent transfer business is in the light-load direction in the business district and therefore adds little to the cost of operation, it was found necessary to continue the existing transfer charge temporarily, but instead of paying all transfer revenues over to the city, as the company now does, it is recommended that this revenue be retained by the company. When the company's net income shall have been increased to the desired amount through the adoption of the proposed co-operative program it is provided that the transfer charge should be abolished.

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*Routing of cars westwardly on City Hall Avenue is temporary only pending construction of single track in Plume Street to accommodate all westbound trolleys in the delivery looping operation, thus eliminating route crossings in City Hall Avenue.

County Zones Changed: The seasonal variations on all lines which operate across the city limits are pointed out as one cause for their unprofitable status. No important economies can be effected in the outlying zones; and hence, in keeping with the conclusions reached from the study of profits and losses by lines and by zones it was recommended that additional revenue be secured outside the city limits through a change in zone limits, which will produce an increase in annual revenue of $265,000, based on detailed estimates and traffic analyses made for each county line.

Summarizing, the fare situation at Norfolk was handled by recommending the continuance, for the present, of the flat uniform 6-cent fare within the city limits, additional revenue from the county zones to be secured largely by changes in zone limits, and net income to be further increased by the elimination of jitney competition, use of safety cars, rerouting and relief of congestion by one-way streets and other traffic regulations, relocation of car stops, reduction of maintenance costs by rehabilitation, increased traffic by extended and improved service, and by revision of franchises with the elimination of obsolete and unjust franchise obligations.

COMPREHENSIVE REHABILITATION PROGRAM RECOMMENDED

Upward of $1,000,000 could be expended on new construction to advantage. Of this, $221,831 for track construction and $330,000 for fifty Birney safety cars is already under contract.

The rehabilitation program of $830,572 includes the relaying of 314,475 ft. of single track, the rehabilitation of cars to the extent of $150,000 and the removal of track and paving repairs to the extent of $132,755. The necessity of completing the more important part of this program in order to improve service, reduce cost and conserve equipment was emphasized.*

REROUTING SUGGESTED

The Norfolk street railway system is of the radial or fan type and the principal feature of the service problem centered largely in the congested conditions in the narrow streets leading into the delivery district. Most of the cars entered and emerged from this district along one narrow street, and operations as found were seriously interfered with by head-on crossings and by unrestricted vehicular traffic.

The obvious expedient of one-way traffic, both with respect to trolley and vehicles, was recommended, and a plan was devised for the co-ordination of all street traffic.

Originally all looping occurred on a single-track loop in the trucking district, occasioning great loss of time. The looping system as laid out and now partially in effect will occur as a simple operation of entering on one street, turning and emerging on another without interference between lines at any point. The group of routes entering the district from the north will loop independently of the routes entering from the south and east. The accompanying maps show the delivery district operation as found and as rerouted.

That jitneys constitute an immense handicap to the traction company in its efforts to provide good service is apparent from the fact that jitneys carry 6,000,000 passengers annually as compared with the 38,000,000 railway passengers in the city and county. As is usually the case, the jitneys in Norfolk cater only to the short rider within the built-up sections of the city.

The report clearly describes the ruinous effect of jitney operations and after an interesting discussion of the subject concludes that:

"The bald truth of the matter is that Norfolk must make a choice between backing her jitneys or backing her street railways."

The report recommends that definite and binding assurance be given to the company by municipal edict providing for the elimination of jitneys upon the inauguration of agreed-upon improvements in street railway facilities.

Overhead Contact System in Heavy Traction

SIR PHILIP DAWSON recently contributed to the Institution of Electrical Engineers of Great Britain a paper on "Electric Railway Contact Systems." Among general principles he points out that the overhead construction and the collector arrangement on the coaches or locomotives must be such as to make it certain that the collector bow will never be liable to come off the contact wire and must also follow the contact wire with the utmost flexibility. For this reason the ordinary trolley wire construction utilized for tramway purposes is unsuitable. In other words, the risk of a collector coming off the contact wire must be no greater than the risk existing today that the wheels of a truck will come off the track. The overhead construction must be designed and put up in such a manner that, while the risk of failure is minimized, the cost of maintenance and the time required for renewal or replacement of any individual portion requiring attention should be reduced to a minimum. At the same time the investment cost must be kept low.

The author points out that the principles adopted in 1907 on the Brighton Railway have been demonstrated by experience in Germany and the United States to have been the correct ones. These were as follows: (1) The conductor wire should be as flexible as possible and all hard spots should be avoided; (2) double insulation is essential and the mechanical as well as the electrical factor of safety of the insulators in overhead construction must be very considerable; (3) all insulators should be placed in positions where they will be least subjected to the direct effect of the hot gases given off the steam locomotives; (4) with the exception of complicated yards and crossovers, the up and down lines should be sectionalized so as to permit them to be cut out independently, while the complicated crossover roads and yards are designed in such a way as to be sufficiently short to be coasted over; (5) insulators should be utilized only under compression, and elastic substances should always be placed between the insulator and its solid support as well as between it and the mechanical construction which it supports; (6) provision should be made when designing insulators that there is no possibility of moisture or water collecting and freezing, thereby fracturing the insulation.

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*The discussion over this and other financial matters in the report was given in the ELECTRIC RAILWAY JOURNAL, Oct. 2, 1920, page 688.

Economical Sectional Pavement for Crossings

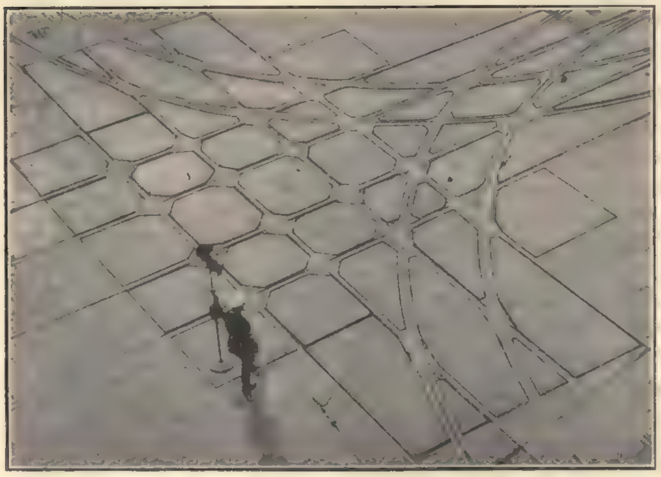
Toledo Railways & Light Company's Street Crossings Are Made Accessible for Tamping by Removable Sectional Construction of Pavement

By A. SWARTZ
Assistant Manager Toledo (Ohio) Railways & Light Company

MOST electric railway engineers have to contend with maintenance of crossings with steam railways having a great deal of heavy traffic, and where city ordinances require a smooth driveway across steam railways it is quite a job to tear out the paving for the purpose of tamping up the crossings. This job is necessary three or four times a year, so that it becomes quite an expensive burden. In Toledo the street railway company maintains nearly all of the railroad crossings, which number around 200, so that this item is an exceptionally expensive one for the company. The company's roadmaster, P. H. Farrell, struck on the idea of providing a paving across these intersections which could be easily removed and patented his idea with the thought that it would be a commercial success.

We have had one intersection of a double-track electric line with a double-track steam railway over which heavy traffic is carried paved with this patent crossing pavement for four years, and the success we have had has proved to our satisfaction that it is a great labor saver.

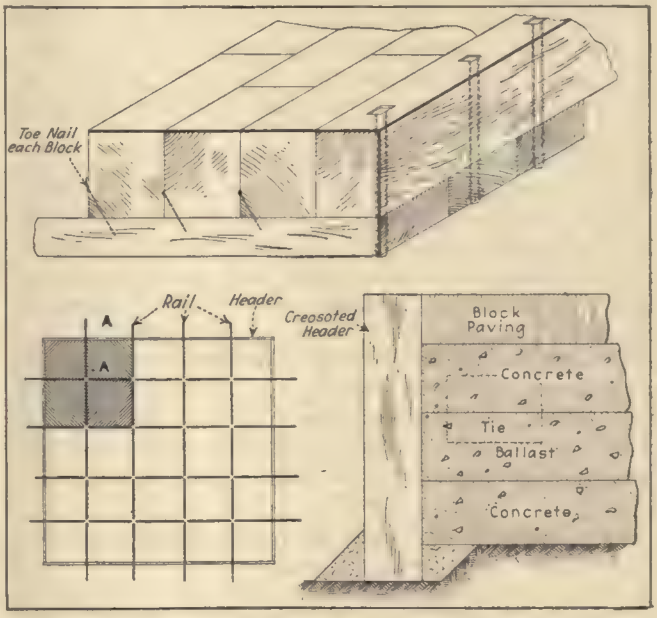
This paving is built up by first providing a floor and a framework which fits carefully in the diamonds or squares of the crossing and which rests upon the flanges of the rails. This box is then paved with wood blocks, each block being nailed to the floor. All the timber used is creosoted, which of course gives a great deal more life to the timber than untreated timber. In the center of each diamond or square a ring is bolted to the floor of the paving to allow each square to be easily taken out with a derrick, so that the track gang may then tamp the crossing. If the derrick is not handy two men with a pinch bar can easily pry up one of the squares.



A TYPICAL CROSSOVER IN TOLEDO WHERE THE REMOVABLE SECTIONAL CONSTRUCTION HAS SPEEDED UP REPAIR WORK

Prior to the use of such paving it sometimes took two to four days to tamp up four crossings, whereas with the new type of paving the work can be readily done in one day. So much success has resulted with the first installation that it was decided to go further with it and to use it in special work intersections in the downtown district, where it will be readily seen that instead of rectangular forms all sorts of shapes would be encountered in making the sections of the patented paving.

The method of constructing special work intersections in Toledo has been to first provide a concrete foundation, on top of which about 2 in. of crushed stone ballast is placed. Above the ballast is placed a bed of concrete on which to lay paving materials. This requires a great deal of labor when it becomes necessary to replace the special work or to surface it. With the new paving we have simply placed ballast on top of the foundation to the top of the tie and form our paving with the patented sections. The top layer of concrete had thus been eliminated and the special work made very accessible for replacement or for surfacing. Some of the paving sections are very ill-shaped and of such a size that to take them out requires the use of a derrick to lift them by means of the ring in the center. The regular street paving is carried forward to the point where the patented paving is to be encountered, between which and the regular paving we have placed wood block crossways of the track to act as a curb for the regular street paving.



METHOD OF CONSTRUCTION AND LAYING REMOVABLE PAVING SECTIONS

All engineers will admit that the secret of good track and special work is proper drainage, so that this fact must not be lost sight of in constructing the type of intersection. To take care of the drainage we have built the concrete foundation with a grade toward a hidden catchbasin, the top of which is even with the top of the concrete foundation. These catchbasins are provided with an iron mesh screen so as to hold back the ballast, but at the same time they permit drainage to enter the catchbasins, which are connected with the sewer inlets in the street corner.

We had one particularly bad double-track crossing in the city where the drainage was very poor; in fact, the intersection lay in a dip of the street grade of both streets so that the crossings received the full benefit of all rain. In the summer of 1919, while repaving this street, we determined to drain this crossing properly and pave it with patent paving. We built a concrete foundation to support the crossings. The foundation was about 25 ft. square, laid with a grade toward one corner and a drainage valley on the line of the diagonal of the square, thus draining into a catch basin which was connected with the sewer inlet. The crossings were laid on crushed stone as described and the patent paving was installed. We have gone through one winter and an exceptionally rainy summer with the best of results so far.

At another point where we have installed the patented crossing pavement where one double-track line crosses another double-track line it was necessary for us to take up the pavement and renew the bolts in the crossings. One foreman and four men did this work and renewed 300 bolts in two nights, working from midnight until 5:30 a.m. After the first night's work they replaced the paving and traffic was carried over the crossings without any interruption, and the next night the paving was again taken up and the work finished, so that there was no delay to traffic necessary. Had the ordinary type of paving been installed, such as brick, Medina, woodblock or any other type, it can be seen that it would have been necessary to do a great deal of work to renew these bolts. We believe that the job would have been open about a week and that it would have cost us about $300 for labor, whereas the way we did it it cost us $55.

This patented paving is in the hands of the Jennison-Wright Company of Toledo, Ohio, and was described in the ELECTRIC RAILWAY JOURNAL for July 5, 1919, page 30. The name of "Kreolite Krossings" has been chosen for this construction. A similar replacement type of construction was described in the ELECTRIC RAILWAY JOURNAL of Aug. 14, 1920, page 326.

A Few High-Lights

Interesting Parts of the Discussion at Fall Conference of British Municipal Tramways Association, Whose Proceedings Were Abstracted Recently

IN THE issue of this paper for Dec. 4, 1920, page 1149, a report was given of the Municipal Tramway Association (British) conference at Cardiff. In some of the papers and the subsequent discussions some interesting statements were made on various subjects, as quoted below:

Speaking of the abuse which always comes subsequent to a showing of necessity of increase in fares, Councilor Higham, chairman of the Blackburn Corporation Tramways Committee, said: "It is always clearly shown that the proper way to increase revenue is to reduce fares instead of increasing them and to lengthen rides in lieu of shortening them, until you are almost forced to the conclusion that the people to manage tramway undertakings most efficiently are those who never had any experience with them, and that if you only reduce fares to the vanishing point you will have ample revenue to meet all your obligations."

In the discussion on fares, J. F. D. Moffett of Belfast said that when he went to Belfast he had to tackle the fare question immediately, but, he said, "I was told immediately this was brought up that if I knew anything about tramway matters at all, I ought to be able to put the finances of the undertaking into a proper state without bothering about fares. 'What about the conductors?' I was asked. 'Are they not missing fares?' I was assured that if they got in all the fares they missed, the problem would be settled. I could not convince the officials that the missed fares, which tramway managers, as we all know, try to reduce to a minimum, are almost a negligible quantity, but after a lot of abuse and a lot of criticism the corporation finally decided to move in the matter."

J. B. Hamilton, general manager Leeds City Tramways, in discussing the fare situation, said: "During the last three years, concurrently with the continued demands for higher wages, most tramway undertakings have come forward and increased their fares." But the speaker said that from his personal experiences while there was a falling off in passengers when the fares were raised, the deficit in numbers was made good again in a short time.

H. Mozley, general manager Corporation Tramways, Burnley, argued that there were serious losses sustained by fares missed by conductors. Mr. Mozley said that there was a method of preventing the overlooking of fares, which, strange to say, was almost confined in its operation to his own system. The method lay in the collection of tickets by the conductor. The missed fares on the British tramways resulted in a net loss of £500,000 a year, yet a simple system could be put into operation which would prevent that loss. The system is as follows: When a car is within a quarter of a mile of the terminus the conductor collects the issued tickets from every passenger.

G. Barnard, general manager Corporation Tramways, Bolton, said: "In my numerous visits to Burnley I have never had my ticket collected, and on most occasions I have never even been asked for it."

A. L. C. Fell, general manager London County Council Tramways, said at one point: "It should be noted that the journals of all the trail cars in London are fitted with radial ball bearings. Tests taken on the level showed the tractive effort at the drawbar to be 17.02 lb. per ton of load with these bearings as against 38.03 lb. per ton of load when the journals were fitted with round bearings, and to this fact low energy consumption can be partly attributed." Mr. Fell gave the following statistics obtained from metered readings on cars in regular service in London, with and without trailers respectively, averaged over a period of forty-five weeks: Tractor and trailer, 2.87 units per car-mile; tractor only, 2.04 units per car-mile.

The passenger-seating capacity of the tractor was seventy-eight and the trailer forty-six.

Diesel Electric Cars on the Swedish Railways

THE scarcity of coal in Sweden and the encouraging results obtained from experiments made in 1913 with the Diesel electric drive for cars have caused further favorable development of this type of car for interurban use. An article appearing in the *Génie Civil* of Oct. 16, 1920, gives some test and operating data on these cars. One of the latest design cars, equipped with an 8-cylinder, 160-hp. Diesel engine and pulling two trailers, made a trip of 69 miles with eight stops in about three hours. The weight of this train, including 189 passengers, was 91 tons and the fuel consumption was about 0.017 lb. per ton-mile. Records kept for the operation over several years showed that fuel cost for the Diesel electric cars was about 6 per cent of that required for steam operation under identical conditions.

Examination Questions for Trainmen

List of Questions Used in Examining Men by Omaha & Council Bluffs Company on Which High Grade Is Required

THE transportation department of the Omaha & Council Bluffs Street Railway, Omaha, Neb., has been making use for several years of a training school for motormen and conductors, which is equipped similar to many other company schools throughout the country, with decided success. After this preliminary training has been completed, and within thirty days from the date they are entered on the roll, all trainmen in Omaha are called in and required to undergo a written examination, which must be passed with a grade for motormen of at least 75 and for conductors of 90. The questions used in these examinations are changed periodically. The questions which appear at the present time on the printed examination blanks are as follows:

MOTORMEN'S EXAMINATION QUESTIONS

1. (a) Name in order the principal pieces of electrical apparatus through which the current passes from trolley to ground. (b) Give the location of each. (c) Give the location of wires connecting each.

2. (a) How would a two-motor car act with a broken motor lead, and what should be done? (b) How would a four-motor car act with a broken motor lead, and what should be done? (c) How would a motor car act with a broken resistance grid or resistance lead? (d) How would you know that a resistance lead or grid was broken?

3. (a) Explain fully how you are enabled to stop a car with a two-motor equipment without line power or brakes. (b) Explain fully how you are enabled to stop a car with a four-motor equipment without line power or brakes.

4. (a) Have you read the rules in the rule book? Are you familiar with them? (b) Answer Rule 81 here . . . (c) If in doubt about a rule or bulletin, what would you do? (d) What is the emergency stop signal?

5. (a) What is to be reported on the regular accident blank? (b) Is it necessary to answer *all* questions on accident blanks? (c) Who is responsible for getting witness names? (d) Are you familiar with Rules 32 and 33?

6. What is the rule in regard to speed on track crossings, curves or switches?

7. (a) What is a circuit breaker? Explains its duty. (b) What is a fuse? Explain its duty. (c) What is a controller? Explain its duty. (d) Should a controller be thrown from a higher to a lower point? (e) How should a controller be fed up when the motor is cut out? (f) In case of controller arcing what is your duty? (g) What is a resistance? Explain its duty. (h) Should a car be allowed to run on resistance points? (i) What is a choke coil? Explain its duty. (j) What is a lightning arrester? Explain its duty.

8. In case you do not get power on the first point, what is the first thing for you to do to ascertain the trouble?

9. (a) What is the rule regarding hand brakes? (b) If air brakes become disabled what should be done?

10. (a) What is a motorman's air valve? (b) Explain its different positions. (c) Should frequent applications of air be made, or should stop be effected with one or at any rate not over two applications? (d) What is an application of air? (e) What is an air governor? (f) What is an air compressor? (g) In case your air gage shows no air, or pressure goes down, what is the first thing to do? (h) Is it necessary to keep close watch on the air gage?

11. (a) What is always the first thing to do before examining the parts of your car, either in vestibule or underneath? (b) What is always your first consideration in case of hazard of injury to person or damage to property?

12. (a) If motor trouble of any kind develops, how would you determine which motor or set of motors was defective? (b) What is the difference in motor conections between a two- and four-motor equipment? (c) How do you cut out a motor at the controller, and give what motor or combination of motors is connected to each cut-out switch? (d) What is a motor?

13. (a) What is your duty regarding broken trolley wires? (b) Span wires? (c) Exit doors? (d) Use of sand?

14. (a) What is your duty running through fog, smoke or other places where your view is obscured? (b) What is the rule regarding two or more cars coupled together, especially at electric switches?

CONDUCTOR'S EXAMINATION QUESTIONS

1. (a) Are you familiar with the proper way to make out a trip slip? An intermediate? A deposit slip? A refund slip? When are refunds made? (b) Which directions are out on trip sheet? (c) Which directions are in on trip sheet?

2. (a) Have you read the fare box rules? (b) Are you familiar with them? (c) Where are registers or fare boxes to be set back to zero? (d) If fare box gets out of order, what would you do? (e) If register gets out of order, what would you do? (f) When should tickets and coupons or employees' pass tickets be canceled? (g) When should fare be collected? (h) Should fares be registered separately?

3. (a) What is to be reported on regular accident blanks? (b) Is it necessary to answer *all* questions on accident blanks? (c) Who is responsible for getting witness names? (d) Are you familiar with Rules 32 and 33? (e) Should you converse with, or give witness names or any information to any one concerning an accident except to the proper company officials? Who are they? (f) What is the proper thing to do in case of a serious accident? (g) What is your duty regarding passengers who are seemingly about to alight from a moving car?

4. (a) In case it is necessary to back your car, where should your position on the car be? (b) Why?

5. (a) What is the rule pertaining to children riding free? (b) Should children not paying fare be permitted to occupy seats to the exclusion of paying passengers?

6. (a) Have you read the rules in the rule book? (b) Are you familiar with them? (c) If in doubt about a rule or bulletin order, what would you do? (d) When is the proper time to look at bulletin boards?

7. What is the rule pertaining to badges that are presented by passengers in citizens' clothes?

8. (a) What are the two best things to use when dealing with the public? (b) In your dealings with passengers when you are in doubt, what are you to do? (c) What is the order regarding collection of fares at end of line? (d) What is the rule regarding conductor depositing passenger's fare? (e) What is the order regarding making up trip slips, such as counting tickets, transfers, hat checks, on a moving car?

9. (a) Who is responsible for waiting for passengers at transfer points?

10. What is the general order in regard to carrying packages on the car?

11. (a) What is the conductor's duty in regard to keeping car clean? (b) In case you receive a dirty car, what is your duty?

12. What is your duty regarding slippery steps and platforms?

13. (a) If your car should become disabled or derailed and conditions were such that it could not be seen readily by drivers of vehicles or motormen on approaching cars, what is your duty? (b) What is always the first consideration in case of hazard of injury to persons or damage to property?

14. (a) When do you issue transfers? (b) What does the originating line mean on a transfer? (c) Why is it necessary to punch the originating line correctly on a transfer? (d) Should a transfer be issued back to the originating line? (e) If after issuing a transfer a passenger changes his mind and wishes to go by another route, should you accommodate him? How? (f) Should you at any time punch a transfer twice so that it would mean two distinct things? (g) How would you determine the time allowance to be given on a transfer? (h) Should your car become disabled, or for any other reason it becomes necessary to transfer passengers to another car, how would you proceed? (i) When transfers are tendered on which the time has expired or which are furnished for a different transfer point, what is the proper thing for conductor to do?

15. What is the rule governing railway crossing?

16. (a) What is the emergency bell signal? (b) When should it be given?

17. (a) Under what conditions would the ejectment of a passenger be warranted? (b) Before taking it upon yourself to eject a passenger from the car, what should you do?

18. (a) What is your duty regarding broken trolley wires? (b) Span wires? (c) Trolley retrievers?

19. In case a passenger has been carried by his destination, what is the conductor's duty?

20. What is the order regarding ventilators?

21. In case of a serious blockade, such as fires, or broken down vehicles, what is your duty?

ELECTRIC RAILWAY PUBLICITY

Devoted to How to Tell the Story

Telling the Public About the Jitneys

EDMUND W. WAKELEE, vice-president of the Public Service Railway Company, is favoring the patrons of the Public Service Corporation and at the same time is placing the company's analysis of the jitney situation before these patrons by mailing to them a copy of his address on "The Street Railways, the Jitneys and the Public," delivered before the fifth annual convention of the New Jersey Utilities Association at Atlantic City on Oct. 30. The address is sent out in an attractively printed booklet.

Mr. Wakelee differentiates between the motor buses which furnish service on independent routes built up under proper franchises or which furnish feeders to other existing methods of transportation and those jitneys which are being operated under mere permits, which add nothing to the development of cities, but increase congestion; which operate under practically pirate methods, and which financially are neither organized nor responsible. He presents an excellent analysis of the transportation demands of the public and the relation of the jitney thereto, and also shows the part the electric railway has played in this problem.

Improvements in Transportation Methods Capitalized

Novel Form of Publicity Used in St. Louis

A NOVEL type of publicity, designed to give the riding public an appreciation of the difference in values offered by the traction company of today and that of twenty-five years ago, was used recently by the United Railways of St. Louis. This consisted of an exhibit, comprising the oldest car in the possession of the company and the newest car, just built and not as yet put into service. The display was placed on an unused track on one of the busy downtown streets and remained there for several days, attracting a great deal of attention from the public. After remaining on view downtown for several days the exhibit was taken around to the various public schools to give the pupils an opportunity to see how their grandfathers traveled.

"Bellefontaine 33," as the old mule car was known, was built in 1875 and was used until 1895. It was "unearthed" recently at the end of the Tower Grove line, where it was formerly used as a waiting station. It was half buried in the dirt, but paint and new trucks worked wonders. Then, in charge of Patrick O'Hare, who has been in the service of the various St. Louis traction companies for forty-five years, the old car, drawn by a shaky and wheezing mule, was sent on its journey to downtown St. Louis. The run took forty-three minutes. The new car, operating under its own power, made the run in ten minutes.

Those who viewed the exhibit were impressed with the fact that the two cars represented epochs having little in common. This contrast between the old and the new was made more vivid by the distribution of a pamphlet describing the cars on display and sketching the conditions under which each operated. This pamphlet summarized the development of the traction industry as follows:

PRESENT-DAY AS COMPARED WITH ANCIENT METHODS

Car 33—Built in 1875. Cost $700. Length, 10 ft. Power, mule. Seating capacity, 14. Heat, none. Cost to heat, 3 cents for straw on floor. Light, two single-burner oil lamps. Cost to light, 2½ cents per day. Ventilators, none. Wages of crew, per hour, 9½ cents (one man).

Car 777—Built in 1920. Cost $15,000. Length, 50.5 ft. Power, electric. Seating capacity, 60. Heat, Peter Smith forced ventilation heater. Cost to heat —77 cents per day. Light, twenty electric lamps. Cost to light, 13 cents per day. Ventilators, sixteen. Wages of crew, per hour, $1.30 (two men).

Fares—1875, 7 cents cash (five tickets for 25 cents). 1920, 7 cents.

Maximum length of ride on Bellefontaine line in 1875—2.5 miles.

Maximum length of ride on Bellefontaine line in 1920, 15.8 miles (without transfer).

In 1875—No transfers.

In 1920—Free tranfers for any city destination.

Average speed of cars in 1920, over four times that in 1875.

Prior to United Railways consolidation in 1899 it took four fares to go from City Hall to Baden—now only one fare.

U. R. present trackage, 460 miles.

Cars in actual service over 1,300 per day (this has increased 100 during receivership). 110 additional cars now under construction.

Number of employees, 6,000.

American Association News

Engineering Association Committee Assignments

(Personnel of committees not yet complete)

Committee on buildings and structures, chairman D. E. Crouse, chief engineer Rochester & Syracuse Railroad, Inc., Syracuse, N. Y.

1. Continue study of equipment for prepayment and postpayment of fares. It is recommended that the committee get in touch with the president of the Transportation & Traffic Association, looking to the appointment of a representative to co-operate with the committee, one who is familiar with this phase of transportation.
2. Report on design of typical shop buildings and shop layouts for property of moderate size. Include results of a study of the practice on progressive properties. Co-operate in this matter with the committee on equipment. The design of shop layout should be consistent with modern plans of routing work through a shop, and this year attention should be confined to what may be termed the "centralized shop plan." It is assumed that the equipment to be carried will be of modern type. The shop layout should also be considered with reference to the impression to be created upon the public.
3. Study existing standards and specifications with a view to possible revision.
4. Co-operate with the way committee in the preparation of specifications relating to preservation of structural timber.

Committee on equipment, chairman Daniel Durie, general superintendent West Penn Railways, Connellsville, Pa.

1. Continue the study of brake shoes, brakeshoe heads and brakeshoe keys.
2. Revise standard tread and flange contours for steel wheels as referred back to the committee by the convention.
3. Prepare standard wheel contour for cast-iron wheels.
4. Revise specifications of carbon steel wheels, referred back to the committee by the association, and take up this matter with the American Society for Testing Materials and the American Railway Engineering Association.
5. Continue study of helical gears.
6. Report on car arrangement and design which are attractive to the public and conduce to comfort, convenience and efficiency of operation.

Program of the
Mid-Year Conference
of the
American Electric Railway Association
to be held at
The Drake, Chicago, Feb. 10, 1921

Main Topic:

Electric Railway Financing

The Papers to Be Presented Are:

1. **Previous Methods of Electric Railway Finance.**
   By JAMES F. FOGARTY, secretary the North American Company, New York.
2. **Present Requirements for Mortgage Securities.**
   By F. K. SHRADER, Halsey, Stuart & Company, Chicago.
3. **Home-Town Financing—Partial Mutual Ownership.**
   By S. B. WAY, vice-president and general manager the Milwaukee Electric Railway & Light Company, Milwaukee.
4. **Necessity of Financing by Sale of Capital Shares.**
   By CHESTER COREY, vice-president Harris Trust & Savings Bank, Chicago.
5. **Municipal Aid in Electric Railway Financing.**
   By MELVIN A. TRAYLOR, president First Trust & Savings Bank, Chicago.

7. Continue study of life of wearing parts of electrical equipment.
8. Report on personal observations of members of committee or their representatives on life of wearing parts on selected properties, and on shop practices relating to improving wearing qualities of parts. The object of this assignment is the collection of first-hand data on the subject. A reel or two of motion picture films might be prepared in connection with this study of the life of wearing parts.
9. Report on present status of direct-current lightning arresters.
10. Study existing standards and specifications with a view to possible revision.
11. Co-operate with the way committee on the possible advantages of curved contours for treads of new wheels.
12. Co-operate with the committee on buildings and structures on the design of a typical shop building and shop layout for a property of moderate size.

Committee on heavy traction, chairman Sydney Withington, acting electrical engineer New York, New Haven & Hartford Railroad, New Haven, Conn.

1. Co-operate with the American Railway Engineering Association regarding progress in heavy electric traction, with a view to keeping the members of the American Electric Railway Engineering Association posted on developments in this field. In this connection cover foreign practice as well as that in the United States.
2. Continue the compilation of statistics regarding electric locomotives.
3. Continue the study of electric switching engines.
4. Study the subject of multiple-unit cars vs. electric locomotives in passenger service, and report on the percentage of service given by means of such cars.

Committee on power distribution, chairman Charles R. Harte, construction engineer the Connecticut Company, New Haven, Conn.

1. Review the overhead crossing specifications.
2. Outline specifications for catenary overhead construction.
3. Continue study of standard stranding of cables.
4. Continue study of standard specifications for wires and cables.
5. Study subject of composition of trolley wire and limits of economical wear, together with causes contributing to wear.
6. Report on present status of direct-current lightning arresters in collaboration with the committee on equipment.
7. Co-operate with the committee on way matters in the preparation of specifications for preservation of wood power transmission poles.

Committee on power generation, chairman A. B. Stitzer, chief engineer Republic Engineers, Inc., New York.

1. Continue study of a form of contract for purchase of power.
2. Continue study of the comparative costs of steam produced from coal and from gas and other special fuels.
3. Report on the progress which has

been made up to date of the report with the so-called super-power plan described at the convention by W. S. Murray.

4. Report on multiple-unit automatic substations, including financial comparisons with manual substation operation.

Committee on way matters, chairman R. C. Cram, engineer surface roadway, Brooklyn Rapid Transit Company, Brooklyn, N. Y.

1. Standardization of frogs and track centers in special trackwork layouts.

2. Report, in co-operation with the committee on equipment, on the possible advantages of curved contours for treads on new wheels.

3. Investigate the application of curved treads to the association standard girder guard and plain girder rails, and the need, in any event, for changing the slope of the tread of the guard rail to agree with the slope of the association standard wheel treads.

4. Investigate the subject of arc-weld joints.

5. Prepare specifications for special trackwork of rail-bound-insert, composite and insert types.

6. Revise girder-rail specifications in respect to methods of tests with particular reference to the impression test proposed by the American Society for Testing Materials.

7. Report on designs of steel and other forms of substitute ties for use in paved streets.

8. Prepare specifications for wood preservation with respect to the several uses of wood or timber in its various forms in the electric railway industry. This matter should be taken up in conjunction with the committees on buildings and structures and on power distribution. The committee on way matters should confine itself particularly to specifications for wood-block paving.

Committee on apprentice systems, chairman F. R. Phillips, superintendent of equipment Pittsburgh Railways, Pittsburgh, Pa. (No detailed assignments yet made.)

Other members of this committee are H. A. Johnson, organization engineer the Metropolitan West Side Elevated Railway, Chicago, Ill., and L. C. Datz, engineer American Cities Company, Birmingham, Ala.

T. & T. Association Committee Assignments and Personnel

Following are details of the committee membership and assignments for three important 1920-1921 committees of the Transportation & Traffic Association:

Committee on economics of schedules, chairman Edward Dana, general manager Boston Elevated Railway, Boston, Mass.; Donald Goodrich, Twin City Rapid Transit Company, Minneapolis, Minn.; E. H. Ives, Detroit United Railway, Detroit, Mich.; H. C. Moser, Fifth Avenue Coach Company, New York City; Samuel Riddle, Louisville Railway, Louisville, Ky.; J. A. Stoll, United Railways & Electric Company, Baltimore, Md.

The committee is to continue the study of economics of schedules; to develop further the definitions and analyses of car-hours and crew-hours, bearing in mind the discussion at the last convention, and with the aid of the accountant members to formulate a definite procedure for keeping operating schedule statistics of member companies on a basis which will make them comparable. Further study should be given to the question of variable running time and a definite recommendation for this committee is wanted on this matter. It is suggested also that this committee include in its report a summary of recent methods developed for improving the handling of traffic in congested centers, along the lines of work done in Boston, Washington and Kansas City by John A. Beeler, also at any other points where the committee feels that steps have been taken of a character to facilitate movement of passengers and cars in congested areas.

Committee on express and freight (chairman to be appointed); W. P. Bristol, the Connecticut Company, Hartford, Conn.; J. H. Crall, Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.; F. D. Norviel, Union Traction Company of Indiana, Anderson, Ind.; W. S. Rodger, Detroit United Railway, Detroit, Mich.; T. H. Stoffel, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; C. E. Thompson, Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.; A. F. Van Deinse, Columbus, Delaware & Marion Electric Company, Marion, Ohio.

This committee is to continue the study of the costs of handling express and freight service and if possible, with the aid of the accounting members, bring it to a conclusion. Further study of how additional business can be obtained from freight and package or express traffic should be made, with particular references to motor truck competition.

Committee on safety work (chairman to be appointed); W. H. Boyce, Beaver Valley Traction Company, New Brighton, Pa.; C. B. Scott, Chicago Edison Company, Chicago, Ill.; E. M. Walker, Terre Haute Traction & Light Company, Terre Haute, Ind.

This committee is to work with a similar committee from the Claims Association on developing methods for public safety work and the utilization of the National Safety Council's plans and methods for decreasing injury and hazard in public streets. C. M. Talbert, Commissioner of Streets and Sewers, St. Louis, Mo., who is chairman of the public safety section of the National Safety Council, is preparing a program of work in which he feels this committee can assist. The public safety section desires to obtain the assistance of electric railways in the adoption of a standard public accident report to be used in all cities of 25,000 population or over. The committee should be prepared to recommend to member companies how they can fit in and push forward the work of the local councils of the N. S. C.

Special Committee on National Reports

President Gadsden is naming a special committee on the Federal Electric Railways Commission report and also on the report of the public utilities committee of the Chamber of Commerce of the United States. This committee will be requested to make a report at the Chicago conference on February 10.

Electric Lines Not Under Railroad Labor Board

The United States Railroad Labor Board handed down a decision on Dec. 18 interpreting the Esch-Cummins transportation act to mean that the board does not have jurisdiction over any interurban or electric lines. Appeals from employees on various electric railways asking the board to hear their grievances were denied. The decision is said to affect every electric interurban line in the country, and many city transportation systems owned by interurban companies.

Arguments in the case were heard several months ago. Members of the board stated at the time their belief that, regardless of which side won, the matter would be appealed to the United States Supreme Court for interpretation of the transportation act.

The board held that the meaning of Congress in the transportation act was to exempt all electric lines "not operating as a part of a general steam railroad system of transportation." The fact that some electric lines haul freight, exchange cars with steam lines, operate in interstate traffic, or use in part the tracks of a steam line does not bring those lines within the provisions of the law, the decision says.

The board also points out that the Interstate Commerce Commission granted the interurbans a freight rate increase, but decided that it had no jurisdiction over the passenger business.

Senator Cummins of Iowa, chairman of the Senate Interstate Commerce Committee and one of the framers of the transportation act, is reported to have said that the decision of the Railroad Labor Board that the act did not apply to interurban electric lines was not in accord with the intention of the framers of the measure.

The hearings before the Railway Labor Board in Chicago have been referred to previously in the ELECTRIC RAILWAY JOURNAL, notably in the case of the Washington & Old Dominion Railway, reviewed in the issue of this paper for Oct. 9, page 730.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Street Collection Successful

Front-End Fare Collectors Help to Handle Rush-Hour Traffic in Milwaukee

Success in expediting traffic during the evening rush hours at heavy loading points has been achieved by the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., through the employment of a number of front-end fare collectors. The company now utilizes for this purpose approximately twenty-five men, though this number varies somewhat with the season of the year and the extent of traffic handled.

The men are recruited from a number of sources. Some are engineering and college students working their way through school, a number are office employees of the company who find this a convenient way of supplementing their earnings. Some are men who have short runs, which they finish out by doing street duty, and the rest are men taken from the extra list. All men employed as front-end fare collectors receive special instruction.

SUPERVISOR AND COLLECTOR IN ONE

Since the Milwaukee Electric Railway & Light Company was one of the first companies in the country to employ front-end fare collectors some of the men have been performing this work for a number of years and have therefore become highly proficient. Such men when placed at important loading points really combine the duties of a supervisor with those of the front-end fare collector.

Collectors report at the car station nearest to their post to receive their fare box and other supplies. They then travel to their post in time to report to the dispatcher over the company dispatching phone system at 4:30 p.m. They remain on duty until 6:15 p.m., when they again report to the dispatcher and then return to the car station to turn in the fare box and account for tickets sold, etc. Though the work lasts from 4:30 to 6:15 p.m. collectors are paid the standard trainmen's rate for two and one-half hours; that is, an allowance for traveling time to and from the car station to point of duty.

The men are equipped with change makers and with locked, non-registering fare boxes which they carry over the shoulder by means of a leather strap. The boxes weigh approximately seven pounds. They are somewhat smaller and lighter than the similar boxes in use on the cars.

Upon reporting at his post a collector stations himself at the intersection in position to load through the front door the first car to arrive. He calls the destination of the car, collects fares, makes change, sells tickets and issues transfers, just as do the regular conductors. When all passengers desiring to enter through the front door have done so the collector moves on to the rear door and assists the conductor in closing it. If a second car has arrived and is being loaded he similarly assists in the loading of the second car. At certain intersections switches have to be manually thrown. If a switchman or supervisor is not present the collector as a rule also acts as switchman.

The accompanying illustration shows a collector in action at West Water and Sycamore Streets, Milwaukee. This is one of the busy intersections in the city, six or seven car lines passing through it. It is taken care of at present by a front-end collector and a supervisor. Any one watching the men at work realizes how tremendously they help to speed up the traffic at this particular point.

FRONT-END COLLECTOR AT WORK

New Grant Suggested at Findlay

To retain the local service of the Toledo, Bowling Green & Southern Traction Company, at Findlay, Ohio, a joint committee of the City Council and Chamber of Commerce as a street railway arbitration committee has taken up the task of drafting a service-at-cost ordinance. The railway has asked the Ohio Public Utilities Commission for permission to discontinue service. The committee will ask that the hearing be deferred again. It was to come up for final settlement on Dec. 17. The committee members feel that a compromise may be effected before that month expires. The report of the commission's appraiser, who valued the property, has arrived at Findlay, but its contents have not been made known.

Open Shop in Buffalo

Wage Increase Arbitration Broken Off by International Railway—Many Applicants for Employment

Owing to a pronounced change in business conditions since last spring, resulting in many applications for employment and a downward trend in wages in all lines, the International Railway, Buffalo, N. Y., announces it will proceed no further with the wage arbitration proceedings involving increases for its employees.

Herbert G. Tulley, president of the International, has made public a letter which Charlton Ogburn, New York, the third arbitrator, has sent to Governor Smith tendering his resignation. Inability of the company to get its employees to agree to terms of arbitration was stated by Mr. Ogburn as his reason for resigning.

Mr. Tulley says that although six months have elapsed since the company appointed its representative to the board there has been no indication of the acceptance of the conditions it laid down by the representatives of the men. The union employees have had no agreement with the International since the last wage contract expired April 30 last. The company now maintains it is running the railway on the open shop basis.

WAGE EFFORT FAILS

The principal condition of the International Railway which never was accepted by the men was that whatever wage increase, if any, was agreed to by the arbitration board should date from the time any fare increase was put into effect that was made necessary by a wage increase. The men always have insisted that the award, if any, should be retroactive to April 30, the date the old contract expired.

As a result of the changed business conditions, "resulting in many applications for employment and a downward trend of wages in all lines," and the resignation of Mr. Ogburn as the umpire on the board, President Tulley explains that "the company would not now be justified in proceeding further with the wage arbitration."

The resignation of Mr. Ogburn and the company's decision to withdraw from the arbitration proceedings mean the complete failure of the efforts of the union's representatives to secure a wage increase for the men.

Mr. Tulley says he will continue to operate on the open shop basis. There will be no discrimination against members of the union, but the general feeling is that the men will resign from the organization because they have found it can no longer be of assistance to them.

Labor Precedents Established

Kansas Court of Industrial Relations Hands Down Interesting Decision in Interurban Case

The nine-hour day is equitable for electric railway workers; Sunday work in electric railway shops is a necessary routine of this industry and not subject to over-time wage payments, and the number of men in freight crews on interurbans is a matter for foremen to decide. These are a few important conclusions of the Court of Industrial Relations for the State of Kansas. The decisions establish precedent. They were made with reference to the operation of the Joplin & Pittsburg Railway, contract features having been submitted to the court by the company and the employees.

TWO QUESTIONS CONSIDERED

In deciding against the eight-hour day for interurban railway trainmen, the court considered two aspects of the question—the interests of the men and feasibility of the eight-hour day plan in the operation of the railway. The work, the court found, was not such as to make a nine-hour day exhausting and the men were not deprived of social rights by such a day. The court had investigated the results which would follow the establishment of an eight-hour day for trainmen. A schedule was prepared on this basis, supposing operation of trains for eighteen hours a day, and it was disclosed that the reduction of the hours per day to eight would involve an additional expense of $25,000 a year for the company. This expense could not be borne, the court said, without curtailment of service to the public, or reducing of wages.

SUNDAY WORK NOT PROFITABLE

Clyde Taylor presented the facts and arguments for the company at the various hearings. He laid stress on the fact that interurban service required seven-day operation of the shop, in order that equipment might be in usable and proper shape for accommodation of patrons. The company, he had pointed out, did not profit by Sunday work in the shop, and it should not be penalized, by being required to pay higher wages for its essential and routine operation of the shop on Sundays. The court took this view, stating that "it is not proper to penalize the company for Sunday work which is absolutely necessary."

REQUEST REFUSED

The request of the men for a ruling requiring the use of three men on freight car strings of three cars or more is denied, on the ground that the employment of three men would serve no public benefit, but would be an unjust burden on the company, to be reflected later in poorer service or lower wages.

An interesting feature of the opinion of the court is that in reference to carhouse men on an eight-hour basis. Several months ago the men, who are paid by the hour, asked that the ten-hour day be reduced to eight. The company acceded, the men receiving pay of course for only eight hours. In these eight hours, as the company stated, the men had done the same amount of work that they formerly did in ten. The court, therefore, said that the men should receive pay for ten hours—a finding acceptable to the company. The increased efficiency, company representatives said, naturally warranted the larger wage.

THE COURT'S DOUBLE FUNCTION

The opinion in this case is providing persons favorable to the present organization of the court, with illustration of the advantage of this method of handling industrial cases. It is observed that the court, in considering the matter of Sunday work for electric interurban companies, the employment of a larger number of men than customary on freight car handling, and the readjustment of hours of labor, looked at the problem judicially from its position as a Public Utilities Commission and also from its position as a Court of Industrial Relations. It weighed the interests of the public, the interests of the men, and the ability of the company to continue uninterruptedly in the service of the public under conditions of employment such as were requested.

ADJUSTMENT REACHED AMICABLY

Throughout the hearings, there was no element of controversy or hostility, no effort to gain a present advantage as an offset to possible detrimental findings by another body. All of the equities of the situation were handled by the one court, in Kansas, in the one series of hearings, and the one program of investigation of conditions by accountants and representatives of the court.

New Subway Bond Issue Planned

Transit Construction Commissioner John H. Delaney of New York City has submitted to the Board of Estimate an application for a new bond issue of $25,981,000 to provide for carrying on construction work upon the city-owned rapid transit system during 1921. Of this amount more than $11,000,000 is for the Interborough system and more than $14,000,000 for the New York Municipal Railway (B. R. T.). The chief item for the Interborough is the extension of the Steinway Tunnel route from Queens westward from Lexington Avenue under Forty-first Street to Seventh Avenue, for which $4,300,000 is asked, and also for the acquisition and construction of storage yards and repair shops in Brooklyn, Queens and the Bronx, $4,250,000. The work planned for the B. R. T. includes $8,200,000 for the subway from the Municipal building south under Nassau and Broad Streets to Whitehall Street and $6,100,000 for the Bushwick-East New York section of the Fourteenth Street-Eastern District Subway line.

Toledo Meeting Jan. 20

Directors of Toledo Railways & Light Company Will Then Ratify Transfer of Property

It appears quite certain now that the board of control of the electric railway system under the Milner cost-of-service ordinance at Toledo, Ohio, will make a selection of commissioner and that the company will be prepared to turn over its property to the new Community Traction Company so that the ordinance may go into effect on Feb. 1.

The matter of the personnel for the new operating company has not been determined, but it will probably be announced immediately following the meeting of the stockholders of the Toledo Railways & Light Company, on Jan. 20, 1921. At that meeting the matter of ratifying the cost-of-service agreement will be taken up and finally passed upon.

NEW PERSONNEL LIKELY

It is expected that Frank R. Coates, president of the Toledo Railways & Light Company, who has been in Toledo in that capacity for more than nine years, will remain as president of both the Community Traction Company and the Rail-Light. That is the only office which may be held in both companies by the same individual. There must be a separation of all other offices.

In the work of separating the properties many difficulties have been encountered. The Doherty interests at Toledo have many diverse lines operating under one holding company and interchanging equipment and labor in various ways.

A method of financing maintenance and improvements in use for the last four years will also cease when the cost-of-service plan goes into effect. During litigation between the city and the company in the federal court Judge John M. Killits set up a fund into which the Rail-Light was compelled to pay weekly 6 per cent of its gross passenger revenues. The fund was called the Craig Fund after its administrator, Captain John Craig. The first payments were made into the fund April 18, 1916, and it has been in operation ever since that time. Fares had advanced twice since that time, but the fund has never been able to catch up with the moneys expended for new cars, track improvements and other service betterments.

CRAIG FUND RESULTS

The federal court will soon issue an order winding up the affairs of this fund. The maintenance and betterments will be automatically cared for in the working of the new plan.

Professor Henry Riggs, of the civil engineering department of the University of Michigan, did not come to Toledo to consult with the street railway board. He merely wrote a letter indorsing two or three candidates who had applied for appointment to the office of commissioner under the new franchise grant.

Wage Reduction Conference Suggested

Detroit United Railway Suggests that Wage Scale Be Reduced in Keeping with Commodity Price Cuts

E. J. Burdick, assistant general manager of the Detroit (Mich.) United Lines, has informed the Amalgamated Association of its intention to move for a reduction in the pay of platform men to be effective on Jan. 1, such reduction to be in line with the lower cost of living now effected. Mr. Burdick explains that the administrative officers have voluntarily submitted to a substantial reduction in their salaries and that forces in other departments have been reduced in numbers. The management has resorted to every possible economy, but owing to an unprecedented decrease in travel the income of the railway has been so reduced that nothing that has been done or can be done will overcome the daily losses that are accumulating. The president of the local division of the Amalgamated has replied to Mr. Burdick with a copy of the resolution adopted at a joint meeting of all the employees affected. This resolution was concluded to the effect that the officers of the divisions are requested to see that the company "observes and lives up to the contracts as the laws of our association require."

THE present scale in Detroit is 70, 73 and 75 cents an hour. The outcome with respect to the proposed wage reduction appears to be uncertain, as the union by its action has closed the door for the time being at least to any conferences. With the knowledge that throughout the country other wage scales have gone down or will go down when factories reopen, it is expected that the railway employees will realize that they cannot remain a favored class at the expense of the car riders whose pay is being cut.

Mr. Burdick's letter to the union follows:

> The company's situation is now such, due to the extreme burden of costs under which it is now and has been doing business, that a readjustment of its burden must of necessity be made.
>
> During the period of the war, as you well know, the company was refused any relief by the public authorities, in consequence of which its burdens increased and accumulated, and the recent slight relief afforded is greatly offset by the increase granted in the pay of employees.
>
> To sustain this increase in pay, the management has resorted to every possible economy, but, owing to an unprecedented decrease in travel, its income has been so reduced that nothing that has been done or can be done in that way will overcome the tremendous daily losses that are accumulating.
>
> Forces in other departments have been reduced in numbers and in working hours, as much as seems wise, and the company's administrative officers have voluntarily submitted to a subtantial reduction in their salaries.
>
> While we regret the necessity for such action, it is none the less imperative that a further substantial reduction in the cost of operation be effected, and accordingly we must hereby give you notice of our intention to move for a reduction of the pay of platform men, to be effective Jan. 1, next, such reduction to be in line with the lower costs of living, now effected—say, 20 per cent.
>
> It occurs to us that you may deem it advisable to acquaint your members with this situation, and to discuss the matter with us without delay, in the hope that an amicable agreement may be reached without resort to arbitration.

In the resolution in reply to the company the men say:

> Resolved, that we, the motormen and conductors in the employ of the Detroit United Railway System, do hereby instruct the joint officers of our three divisions to wait upon the officers of the company and to inform them that upon the part of their employees we are surprised at the action that they have taken and to point out to them that they have agreements with our respective division associates which specifically provide for the wage and provide when and how it shall be changed and that for the company to attempt to change this wage on Jan. 1, 1921, would be a flagrant violation of the contract that they have with our respective divisions.

The officers of the union are then instructed with respect to the specific clauses in the present agreement between the railway and the men that should be called to the attention of the officers of the railway. The resolution is concluded as follows:

> Then call their attention that while the agreement with Division No. 26 does not state any specific date of opening, that it was an understanding which has existed for some time that this agreement shall be opened once a year and has always been opened at the same time that the other divisions' agreements just quoted, and the present scale of wage was agreed to in May, 1920, jointly as was in all these other agreements and that, therefore, any reduction in the wage of any of the membership of these three divisions on Jan. 1 would be a violation of the contract that has existed for years between our respective divisions and this company, and that upon the part of the employees we protest and will not agree to accept any reduction of wage or any change in these agreements so long as they are in force and binding upon membership and the company.
>
> The officers of the joint divisions are requested to carry out the above instructions and to see that the company observes and lives up to the contracts as the laws of our association require.

In a statement which he made Mr. Burdick said that unwarranted statements from whatever source do not and cannot alter the great fact that the Detroit United Railway's receipts have not been, and are not now, sufficient to meet all proper cost obligations and that a material readjustment in the way of decreases in wages and some increase in the rate of fare are both vitally necessary in order for the company to continue serving the people. He said:

> Our records are open to competent investigation by anybody before which all of the facts may be brought forth and will be found fully to justify what I have said.
>
> When wages of motormen and conductors were advanced from 50 cents, 55 cents and 60 cents to the present scale of 70 cents, 73 cents and 75 cents—increases ranging from 25 per cent to 40 per cent—in order to meet the growing cost of living, it was patent to all that, facing the same living conditions, other employees had also to be advanced. This was pointed out in the company's letter to the Common Council of May 24 of this year.
>
> To provide the necessary funds the company at that time asked for an increase of 1 cent in the fares, making the rate flat 6 cents, or if more convenient to the public a combination cash and ticket fare producing practically the same financial result.
>
> When in the hearing before Judge Jayne it was agreed to try out a 6-cent cash fare with nine tickets for 50 cents it was done because of an assurance that in or connected with a suit before Judge Jayne a just and lawful rate of fare would be established. The accepted rate was substantially less than we were confident to be necessary to meet all proper and necessary costs of conducting the system. This need existed with all due allowance for a continuing increase in business. That increase has stopped. It has not only stopped but we have gone backward.
>
> Our passenger receipts for the month of December are below those of the same period of last year, and that decrease is getting worse every day. But during this same period of decreased income our expenses, including wages, have been in excess of those of a year ago.
>
> With our income decreasing and with certain fixed charges, such as taxes, that cannot be cut and with other necessary obligations it is clear to all who have made a study of the situation that reductions in salaries and wages of the men cannot go far enough to meet the loss and that even with these reductions in the pay-roll a small raise in the fare is necessary to continue operation. It is impossible to render service much longer under present conditions.
>
> The great reduction in the number of people riding has resulted in some reduction in the amount of service, but the saving through this cannot be made proportionate with the reduction in receipts. We cannot shut down and stop expenses like other lines of business, but we can be stopped for lack of money to go ahead.
>
> As stated in our letter to the motormen and conductors the executive officers of the company have taken a reduction in salaries. Following a conference of department heads Saturday morning, reductions in salaries of all departments were decided upon in order to help through a serious situation. It is, of course, only proper that wages of motormen and conductors—their combined wages consisting of the largest single item of expense—must also come down. Any other action would result in too great a burden on the riding public.
>
> Our situation with respect to the interurban lines is similar to that within the one-fare zone. The fare increases granted by the State Legislature have not resulted in giving the company a sufficient income. While the fare was fixed at 2 cents a mile, the exemption of cities and the territory within 5 miles thereof have brought the average rate per mile to considerable below the 2-cent rate.
>
> In the endeavor to bring about a proper readjustment of the transportation situation we most respectfully ask of the people and those in authority a calm and earnest consideration of the matter. We are doing everything in our power to keep the wheels turning, but I am very frankly stating that a readjustment is needed and is needed speedily. It is not a political but a business problem that confronts all of us.

Utilities Need Funds

Jacob H. Schmuckler, writing for the *Financial World* on the subject "The Interesting Status of Utility Bonds," says "we shall undoubtedly see large public utility flotations for years to come." He regards this as a favorable sign. On the matter of earnings Mr. Schmuckler says the monthly net earnings figures, so far as they are available, indicate improvement compared with corresponding periods last year. In regard to financing for the future the author says:

> The public utility properties of this country need a great deal of new funds, and need them badly. These are necessary not only to put present properties in good condition but also to expand them to care for the requirements of the various communities throughout the United States. We shall undoubtedly see large public utility flotations for years to come.
>
> On first blush these flotations may strike us as an unfavorable factor, but in reality they are favorable, if only the money can be raised, for the funds will be used to put the properties on a plane of high operating efficiency and will permit the expansion demanded.
>
> The services rendered by the utility companies are necessities, and once net earnings improve to the point where they will be sufficient to cover interest charges with liberal margins and will enable the properties to be taken care of as required the problem is solved.

$500 Awaits You

This Liberal Reward Is Offered for Solving Seattle Municipal Railway Problem

The Seattle *Daily Times*, the leading newspaper of the city, has established a novel contest, dealing with the problem of municipal operation of the city's railways. The contest provides a prize of $25 each week for the best solution of the present railway situation and suggestion for rehabilitation of the lines presented by a citizen of Seattle.

The weekly prizes will be offered for twelve successive weeks. At the end of that time the author of the best of the twelve weekly prize-winning letters will receive an additional prize of $200. The management of the *Times* is to be the sole judge throughout the contest.

In the event that the final prize winner's plan, complete and unchanged, is adopted and put into effect by the City Council, or other constituted authority, within two months of the announcement of the prize award, an additional $300 will be paid the author of the plan, provided the plan is kept in operation for a period of six continuous calendar months. Furthermore, in the event any other plan submitted in the contest and published by the *Times* other than the plan picked by the *Times* is adopted by the city, as above, a special prize of $100 will be paid the author.

No Seattle newspaper ever before made so ambitious an attempt to poll popular sentiment on a matter of this kind. It is pointed out by the management that this is a "community problem"; that the Mayor and the City Council and the street car executives are all working on it and seeking relief, and it is intimated that some citizen of Seattle, now engaged in public life, may have hit upon a satisfactory solution.

The contest has aroused a great deal of interest by the public. Six to eight letters are published daily in the columns of the *Times*. Some fantastic and impractical solutions have been suggested, but most of them indicate that patrons of the railway have devoted earnest thought to the transportation question. Most of the letters agree that the jitney bus must be eliminated. Many suggest that the fare be left as it is, or reduced, and the expensive transfer abolished or be issued only upon additional payment.

Chicago Traction Commission Report Said to Be Completed

The plans of Mayor Thompson's traction commission for the construction of a subway system in Chicago and the creation of a local transportation district governed by five trustees are reported to have been completed at an executive session of the commission on Dec. 20.

The Mayor is said to have put his unqualified approval upon the eight months' work of the commission's lawyers and engineers. The plans are in the hands of the printer. They are expected to be made public within the next week or two.

It is understood that George W. Jackson, the commission's subway engineer, recommended two subway plans. The one approved by the commission includes two lines radiating diagonally southeast and northwest from the loop district under Ogden Boulevard and Milwaukee Avenue, respectively. The other scheme contemplates the building of 18 miles of subway and underneath Ashland Avenue, which is a north and south street not passing through the loop, to run from Lawrence Avenue on the north to Sixty-third Street on the south, with a main tube under Madison or Washington Street connecting this to the loop.

News Notes

One-Cent Ride Over Bridge.—Shuttle service over the Williamsburg Bridge, New York, at a 1-cent fare is a new plan suggested by Grover A. Whalen, commissioner of plant and structures. The 1-cent fare seems unlikely, but there is possibility that the charge for the trip will be three tickets for 5 cents.

Speakers' Bulletin No. 4 Issued.—The Illinois Committee on Public Utility Information, Chicago, has issued Speakers' Bulletin No. 4, the fourth of a series of printed pamphlets designed to supply information and give suggestions to those who would speak in behalf of the public utilities. Bulletin No. 4 deals with the subject of the "regulation of public service companies—just and reasonable rates."

Service-at-Cost a Real Success.—A unique service-at-cost scheme has been put in operation in Dallas, and according to all reports this plan has been successful. The "rolling stock" consists of non-perishable groceries. "Replacements" of bacon, flour, etc., are in the hands of Conductor Woodson, with Mrs. Woodson assisting in the operation of the business. This co-operative cafe-grocery was opened on Nov. 15 at the East Dallas carhouse. The plan behind it is service-at-cost. The cafe-grocery was established as a result of the insistent demand that employees be relieved of the necessity of patronizing inferior places where high prices prevailed. Purchases are limited to company employees and their families. In discussing the new enterprise Mr. Crampton, superintendent of the safety and efficiency department, said: "The cafe-grocery is operated wholly in the interests of employees. No effort will be spared to make its service of the highest quality and at the most economical cost."

Algiers-Gretna Men Again on Strike.—The conductors and motormen of the South New Orleans Light & Traction Company, New Orleans, La., operating between Algiers, Gretna and several small towns on the upper side of the Mississippi River, have gone on another strike for an increase in wages. This is the second strike of the men in six weeks. On Nov. 1 the men struck, but returned to work on Nov. 24, under a retroactive wage agreement. At that time a committee named by the Jefferson Parish Police Jury investigated the finances of the company to find out if it should be permitted to increase its fares. The decision was not in favor of the company and accordingly it refused to pay the 45 cents an hour which the men are demanding. The employees involved, about seventy in all, have refused a wage scale equivalent to $96 a month, alleging that it will be impossible for the officials to obtain competent men at that price. The new district attorney and the legal adviser of the police jury of Jefferson Parish have been asked to take steps to bring action against the company to forfeit its franchise.

Christmas Bonus in Los Angeles.—Approximately $60,000 was received by trainmen of the Los Angeles (Cal.) Railway as a Christmas bonus. The awards were made on Dec. 15. They marked the first payment under the company's merit system, established last April. The amount of bonus received by each trainman was based on his efficiency record. A rating of 100 per cent or better each month brought a bonus of $5 for that period so that $40 was the maximum for the eight months the merit system had been in operation. All trainmen who had been with the company six months participated, the total number being approximately 1,500. Of these 90 per cent received the full amount. The merit system of the Los Angeles Railway was established by G. J. Kuhrts, general manager. It is known as the Kuhrts plan. Records are kept of every trainman. Demerits are assessed for discourtesy, careless operation and other offences, but they can be counterbalanced by credits which are awarded for commendations.

Programs of Meetings

Central Electric Traffic Association

The Central Electric Traffic Association will hold its annual meeting in Toledo, Ohio, on Jan. 19 and 20.

Central Electric Accounting Association

The Central Electric Accounting Association will hold its meeting in Dayton, Ohio, on Jan. 22, 1921.

Central Electric Railway Association

The Central Electric Railway Association meeting will be held on Jan. 27 and 28. The place has not yet been decided upon and the program is not definitely arranged.

Financial and Corporate

Purchase Vote Jan. 1

Council Accepts Offer of Mackenzie Interests for Sale of Light Plant and Radial Railway

The City Council of Toronto, Ont., has accepted the proposal for the sale of the Toronto Electric Light Company and the Toronto & York Radial, Metropolitan and other railway lines within the city limits. The balance of the properties are acquired on behalf of the city of Toronto and all other Ontario municipalities embraced in the hydro-electric power and radial systems. The necessary by-law providing for $10,000,000 of bonds, being the city's share of the purchase price, will be submitted to the ratepayers at the municipal elections on Jan. 1.

The by-law providing for the raising of $500,000 for the use of the Transportation Commission to purchase and operate motor buses was withdrawn, as it is understood that the necessary legislation has been promised by the Ontario Government without the necessity of obtaining the sanction of the ratepayers.

DINNER TO SIR ADAM

After the Council had adjourned an informal dinner was tendered to Sir Adam Beck by the Council at the King Edward Hotel, when he was presented with a magnificent loving cup. At the dinner Sir Adam Beck predicted that the 1,000,000 hp. which will be the capacity of the Niagara plants when the Chippawa development is completed will be entirely absorbed within a reasonable number of years.

In connection with the railway question, Sir Adam stated that a single fare is to be established on the Scarboro and Mimico divisions of the Tooronto & York Radials. Yonge Street through North Toronto is to be improved and the Metropolitan section on that street is to be double-tracked. An up-town terminal for the Hydro-radials is to be acquired at a point near the city hall. Passengers coming into the city from the Scarboro division would be enabled to transfer on the one fare to the proposed fast line to be constructed along the water front on the property of the Toronto Harbor Commission.

It is understood that the city of Toronto alone acquires the plant and properties of the Toronto Electric Light Company and also that section of the Metropolitan Division of the Toronto & York Radial Railway's line lying within the city limits on Yonge Street.

The purchase price of the Toronto Electric Light Company's distribution system within the city is $7,226,295 and the price of the Metropolitan line is $585,000, making a total of $7,811,295, which is to be paid for by the assumption by the city of Toronto of 6 per cent bonds against the property of the Toronto Electric Light Company to the extent of approximately $840,000 and the issue by the city of 6 per cent bonds to the extent of the balance.

The city of Toronto, however, is to transfer to the Hydro-Electric Power Commission the right-of-way and physical assets it now owns with the city on the Kingston road to the Woodbine and on the Lake Shore road from the Humber River to Sunnyside.

It is expected that the necessary by-laws will be at once prepared and submitted to the ratepayers of Toronto at the municipal elections on Jan. 1 next.

All the other properties are acquired by the commission for and on behalf of the city of Toronto jointly with all the other municipalities who now own the Ontario hydro-electric power system of generation, transmission and distribution.

Abandonment Authorized

The Ohio Public Utilities Commission, on Dec. 16, issued an order authorizing the Southeastern Ohio Railroad to abandon its tracks and discontinue its service in Zanesville, Ohio, from Sixth and North Streets in that city to the Mill Run station of the Ohio River & Western Railway, a distance of approximately 1 mile. The order is effective Dec. 31 and follows the application of the company for such authorization.

The finding of the commission was as follows:

1. That said tracks have been in operation for more than five years next preceding the date of the filing of the application herein.

2. That the service upon said division was maintained during the fiscal year ended June 30, 1920, at an actual operating cost of $11,318; that the revenues arising from the operation of said division during said period was $8,533, and that the actual deficit for operating said division during said period was $2,782.

3. That the continued operaticn of said division would jeopardize the successful operation of remainder of the applicant's system.

$6,234,141 Knoxville Value

Investigating Engineers Report This Amount to Tennessee Commission as Historical Cost

The report on the appraisal of the property of the Knoxville Railway & Light Company, Knoxville, Tenn., prepared in accordance with order of the Tennessee Railroad & Public Utilities Commission, was filed on Dec. 19, 1920.

TWO APPRAISERS FILE JOINT REPORT

The appraisal was made by Albert S. Richey, representing the State, and J. H. Perkins, representing the company. The city of Knoxville also had a representative, W. H. Weiss, but he failed to concur in the report as filed by the other representatives. It is understood that he will prepare a separate report.

OVERHEAD COSTS OF KNOXVILLE RAILWAY & LIGHT COMPANY

	Original Cost Basis		Reproduction	Cost Basis
	Railway, per Cent	Lighting, per Cent	Railway, per Cent	Lighting, per Cent
Engineering and superintendence	6.0	6.0	7.5	7.5
Franchises	0.25	0.25	....	....
Law expenditures	0.50	0.5	1.0	1.0
Interest during construction	5.0	5.0	8.0	8.0
Injuries and damages	0.5	0.5	0.5	0.5
Taxes	0.35	0.35	0.35	0.35
Miscellaneous before construction	5.0	4.0	5.0	4.0
Miscellaneous during construction	2.0	1.0	2.0	1.0
Working capital	$165,000	$160,000	$165,000	$160,000
Cost of financing	$255,508		$533,787	
Development cost on 7 per cent return	$314,268	....	....	......

The engineers representing the State Commission and the company found that the value of the property based on an inventory as of July 1, 1920, was $6,234,141, under the original or historical cost basis, divided $4,203,247 to the railway department and $2,030,894 to the lighting department. Exclusive of unamortised superseded property, which was found to be $554,207, the investment totals $5,679,934, of which $3,738,351 is credited to the railway and $1,941,583 to the lighting department.

On the reproduction cost basis, using prices current during the first six months of this year, with a deduction for accrued depreciation or lack of newness, so called, amounting to $1,967,522, the value determined upon was $10,362,964, of which $6,992,986 was found to be represented by the railway and the balance, $3,369,978, by the lighting department.

STATEMENT OF HISTORICAL VALUE

The historical or investment value found checks within 2.35 per cent of the actual money put into the property by the present owners. The actual expenditures since acquisition Sept. 1, 1905, total $6,087,600, divided as follows: at the time of acquisition, $1,770,950; underlying securities assumed, $1,150,000; property additions from that time to the date of appraisal, $3,166,650. Additions to the physical bases under each of the two methods used were made for the usual overhead expenses in addition to superseded property as shown in above table.

The engineers also found that to bring the property into a state of normal operating efficiency as of July 1, 1920, it would take an additional expenditure of $235,000 in the railway and $45,000 in the light department.

The State Commission in its order had requested that a segregation be made of the renewable or depreciable property to determine the proper allowance for renewals and replacements. The engineers found that the original cost of the renewable property was $4,012,420 and that on the reproduction basis it would be $8,422,596.

Replacement Allowance Should Vary

The engineers believed that $150,000, or approximately 3.75 per cent of the cost of renewable property, would be a proper annual allowance for the renewal and replacement reserve. However, they stated that such annual percentage allowance should be varied from time to time so that the reserve may never be greater than 6 per cent nor less than 2.5 per cent of the original investment in renewable property of the company.

Suit for Restoration Brought at Columbus

Pages in the past history of the Columbus Railway, Power & Light Company, Columbus, Ohio, were turned back and aired on Dec. 7, in the courts of Franklin County, when a cross petition was filed in the Augusta Slaymaker suit, which was originally brought some time ago, by the present board of directors of the company.

Unlawful diversion and misuse of corporation funds are charged in the cross petition, which, as in the Slaymaker original petition, is directed against all the old directors of the company, but more specifically against the E. W. Clark Company, the E. W. Clark Management Corporation, Clarence M. Clark and their associates.

The Slaymaker suit sought to compel an accounting from the Clark interests. The case was filed in January, 1919, and is now proceeding before a master commissioner in the county courts. Through the cross petition the present directors of the Columbus Railway, Power & Light Company hope to recover the sum of $3,728,952.

The cross petition avers that at the dictation of the Clarks and their representatives the company tried to surrender its franchise and that this action cost the company $209,032 in revenue because many persons refused to pay fares. Other charges are made in the bill.

Almost coincident with the filing of the cross petition the Columbus Street Railway Home Rule Association, of which former Mayor George S. Marshall is president, announced that steps were being taken toward submitting to the Legislature a bill which would, if passed, terminate so-called perpetual franchises, such as the Columbus company claims to hold with respect to several local lines. The association would have the perpetual franchises terminated at the same time the blanket franchise held by the company expires on March 4, 1926.

Underlying Companies Win

Superior Court Decides Commission May Not Interfere with P. R. T. Rentals to Subsidiaries

The Superior Court of Pennsylvania, as noted briefly in the ELECTRIC RAILWAY JOURNAL for Dec. 18, page 1261, has handed down a decision practically denying the right of the Public Service Commission to concern itself with the question of the rentals paid by the Philadelphia Rapid Transit Company to its subsidiaries.

The Commission Order Denied

The opinion in the case was written by Judge Head. He denies the order of the commission requiring the underlying companies to file answers to averments made by the United Business Men's Association with regard to the rentals of the underlying companies. The court said:

> The contracts in question cannot be attacked before the administrative body with the avowed end of having the rentals therein provided reduced to such sum as the Public Service Commission may determine should have been the rentals provided for. A very learned argument was advanced by one of the counsel for the intervening appellee to prove that all, or nearly all, of these leases were absolutely void because the makers of them, themselves being lessees, had exceeded their lawful power in fixing the terms of the lease Such an argument might well be addressed to the highest court in the land, and it seems manifest that a decree, striking down these leases on the purely legal grounds advanced in the argument, would be an exercise of the highest judicial power and authority. We are unable to perceive how it can be seriously urged that upon the complaint pending before the commission, that administrative body could be successfully asked to enter a judicial decree of the magnitude and character indicated.
>
> The commission has ample power, without doing violence to any legal principles, to compel the rendition of adequate service at fair rates over the property owned by the appellant companies, and there may come a time soon, without attempting to overstep its power, when it may with propriety take action, the result of which would very seriously affect the rentals under the contracts in question. But, as we view the case no ground is presented here for the action of the commission sought for in the complaint filed.
>
> We are of the opinion the order complained of was unreasonable and unnecessary, and that as to the present appellants the complaint of the intervening appellee (United Business Men's Association) should have been dismissed. A similar order to the one we now enter will be made in each of the other appeals.

Contracts Secure from Interference

On the one hand, the court said it was not prepared to accept as sound the broad proposition of counsel for the appellants that the Public Service Commission has no jurisdiction over the underlying companies. On the other hand, the court said that the Public Service Commission, in ascertaining a fair value of the property of the Philadelphia Rapid Transit Company, should not necessarily be obliged to consider the private contracts between the operating company and its lessors, the owners of the property. On this point the court said:

> As between the parties who made them these contracts are as secure from interference as those of other citizens. But the public was no party to those contracts and no stipulation therein contained, for the benefit of one or the other of the parties thereto, can deprive the public of its paramount right to reasonably adequate service at a reasonable rate.

In September, 1919, the Cliveden Improvement Association filed complaint with the Public Service Commission that the Philadelphia Rapid Transit Company was seeking to have its rates of fare increased when such increase was not necessary. It desired the commission to prescribe a 5-cent fare, with universal free transfers in all sections, and that an order be made on the company to set aside certain sums annually for maintenance or renewal of the facilities of the company to enable it to render adequate public service. Further, that the company be ordered to expend a sum of $1,000,000 yearly on extensions, until all of the city had adequate service. An answer was filed by the operating company.

In February, 1920, the United Business Men's Association asked leave to intervene and filed a new complaint alleging inability of the railway to render adequate service at reasonable rates, resulting from the fact that it was but lessee of most of the property it operated and by reasons of terms of underlying companies it was compelled to pay exorbitant rentals to the underlying companies, the real owners. The association asked that the commission inquire into the fairness of these terms of their agreements with the transit company and their leases, and, if necessary, reduce the rentals.

More Than $1,000,000 for Taxes Alone in Cleveland

Increased taxes are going to take a considerable part of the gross receipts of the Cleveland (Ohio) Railway and of other public utilities operating in Cleveland, according to figures just made public by John A. Zangerle, Auditor of Cuyahoga County.

As a result of an increased rate, approved by the voters at the November election, the Cleveland Railway will have to pay $70,943 more on its real estate and personal property this year than it did a year ago.

This increase will fall upon the Cleveland Railway in spite of the fact that the company's valuation has been reduced more than $4,000,000 by the State Tax Commission. The valuation on which the company will pay its taxes in Cleveland this year is $26,657,850. The total county taxes paid by the company for this year are $649,413. Including the state excise tax of 1.2 per cent, and the federal income tax, the Cleveland Railway's total tax bill for 1920 will exceed $1,000,000.

In all, by reason of the increased tax rate and higher valuations, public utility companies in Cleveland, exclusive of steam railroads, will have to pay $532,783 more taxes on their real estate and personal property during the coming year than they did during the past year. Of this sum the Cleveland Electric Illuminating Company alone will have to pay $231,023.

Judge Keller, who dissented, said that the appeals of the underlying companies should be quashed, as the order to answer made by the commission "is not such a finding as may be appealed from."

Only 74 Miles Left

Shore Line System of 246 Miles Reduced Through Abrogation of Leases and Sales

Many changes have been made in the corporate affairs of the Shore Line Electric Railway, Norwich, Conn., under the receivership. These changes, coming singly and at intervals separated sometimes by months, have naturally left some doubts as to the present status of the company.

The road originally consisted of 246.28 miles, both owned and leased. Of these the leased lines, consisting of 107.45 miles, were operated by the receiver for six months and then turned back to the Connecticut Company by annulling the lease.

EFFORT TO RESTORE PART OF LINE

Of the original system the receiver on Dec. 12 was operating 74.17 miles. In the case of 64.66 miles the track material has been sold to be dismantled and about 8 miles have actually been dismantled. An effort is now being made by the people along the line to purchase the track material from the second-hand dealers to whom it was sold and to purchase from the receiver the other part of the property necessary to continue operations on 47.61 miles of track or, to be specific, that portion of the road between New Haven and Chester.

The Shore Line Electric Railway went into the hands of R. W. Perkins as receiver on Oct. 1, 1919, by petition of its stockholders. The same receiver was later appointed under an action brought by the trustee under the mortgage, the two causes being joined. There has been no foreclosure sale, but the property is in process of liquidation. No receiver's certificates have been issued.

The outstanding capital stock at the time of the receivership was $1,000,000; the funded debt, $6,700,000, and the floating debt, $1,600,000, this sum including matured interest and rent unpaid.

P. R. T. Shows Surplus for November

In its report for November, 1920, the Philadelphia (Pa.) Rapid Transit Company shows a total operating revenue of $3,726,376 or 22 per cent over the corresponding month last year. With expenses including payment of full wages for the month the operating income is $1,192,200 against $1,032,844 for November, 1919. After deducting fixed charges the net income amounts to $372,926 and subtracting a 5 per cent return on P. R. T. stock the company shows a surplus of $247,926. In its eleven months' operation the net income decreased 49 per cent over the same period a year ago. In submitting its report the company makes the following comment:

"The November net income $372,926, as shown, is larger than will be the monthly income during the six-month period of the fare authorization to April 30, 1921; the coming winter months, January to March, represent the period of lightest travel and heaviest expense. The net income for November, $372,926, will, it is expected, be increased during the six-month period to April 30, 1921, to a net income of about $1,000,000, nearly all of which amount will be necessary to pay the back wages of the men in the train service."

Net income $858,306, as shown, includes $485,379, net income January-October, inclusive, which was expended in improvements to cars, center exits, etc.

INCOME STATEMENT PHILADELPHIA RAPID TRANSIT COMPANY

Month Ended Nov. 30:		1920	1919	Percentage Change Over 1919
Operating revenue		$3,726,376	$3,055,953	22.0
Operation and taxes (Includes payment of full wage scale for the month)		2,589,132	2,065,139	25.2
Operating income		$1,137,244	$990,814	14.7
Non-operating income		54,956	42,029	30.7
Gross income		$1,192,200	$1,032,844	15.4
Fixed charges		819,273	813,854	0.7
Net income		$372,926	$218,989	70.5
5 per cent return on P. R. T. paid in capital—One month		125,000		
Surplus		$247,926		
Eleven Months Ended Nov. 30:		1920	1919	Percentage Change Over 1919
Operating revenue		$34,917,705	$32,216,937	8.4
Operation and taxes		25,594,733	22,094,180	15.9
Operating incme		$9,322,972	$10,122,756	—7.9
Non-operating income		531,266	483,341	9.9
Gross income		$9,854,238	$10,606,098	—7.1
Fixed charges		8,995,932	8,923,349	0.8
Net income		$858,306	$1,682,748	—49.0
Deferred wage adjustment—Period to Oct. 31	$903,735.84			
5 per cent return on P. R. T. paid in capital—Eleven months	1,375,000.00	2,278,735		
Amount by which gross revenues are insufficient to provide for operating expenses, taxes, fixed charges, and the 5 per cent return upon P. R. T. stock		$1,420,429		

Financial News Notes

Receiver for Vermont Road.—H. J. Volholm, retired merchant and trustee of the Capitol Savings Bank & Trust Company, has been appointed receiver for the Barre & Montpelier Traction & Power Company, Montpelier, Vt., on the petition of the Westinghouse Electric & Manufacturing Company and others. Under the order of the chancellor cars will be run at least until Jan. 3.

South Morgantown Line Taken Over.—The Union Traction Company, recently organized by Morgantown citizens, has taken over the lines formerly operated by the South Morgantown Traction Company and expects to operate such lines in the future. The new company has a capital stock of $50,000. The incorporators were James H. McGrew, A. J. Barlow, Frank Cox and George C. Baker.

Subsidy Defeated at Gloucester.—The outstanding issue of the recent election at Gloucester, Mass., was whether or not the voters would accept or reject a proposition to pay not less than $20,000 annually if a deficit should ensue for operating the Eastern Massachusetts Street Railway between Rocky Neck and Lanesville. This service was cut off on June 20 and jitneys were substituted. The proposition was rejected, 4,492 voting against it and 1,001 voting yes.

Tacoma Municipal Road Still Losing.—The Tacoma (Wash.) Municipal Railway showed a deficit of $4,614, for the month of October, according to a report recently filed by City Comptroller John M. Roberts to the City Council. The road failed to pay operating expenses by $1,566, to which is added charges for interest, depreciation and gross income tax. The deficit during the operation of the line now totals $137,944, of which $29,516 is for this year's operation. The operating revenues for October were $11,624 and the operating expenses were $13,191.

Order Sought to Sell Road.—Judge Mouser has approved a report from George Whysall, receiver of the Marion (Ohio) Suburban Railway, of date of Dec. 6, wherein the receiver asks the court for authority to dispose of the property of the company at the best price obtainable. The court has ordered the receiver to have the property appraised and sold to satisfy a judgment for $329 obtained against the company in the court by Charles W. Leffler, and others, Sept. 11, 1920. The receiver states that in his opinion there is no present possibility of the line being operated, and calls attention to the fact that the City Council by ordinance adopted, June 16, 1920, ordered the tracks removed from the streets.

Traffic and Transportation

Public Must Decide

J. P. Barnes Puts Louisville Traction Problem Squarely Up to People—Plans to Cut Service

Electric railway service in Louisville, Ky., will be drastically curtailed beginning Jan. 1, 1921, unless steps are immediately taken by the city authorities to relieve the financial condition of the Louisville Railway. James P. Barnes, president of the company, has announced that the railway can no longer continue to furnish service of the present quality at a nickel fare, and that a program of retrenchment is imperative to preserve the city's transportation system. He therefore proposes to close the smaller of the two power stations, thus reducing rush-hour service approximately 25 per cent. It is also proposed to restrict the transfer privilege and to reduce general schedules.

"RELIEF"

Which road is taken is a matter of vital interest to you. You must make the decision. Twentieth Century sentiment is agreed that the needs of those served by a public utility shall have first consideration. You must decide what is your best interest. Whatever your decision, my efforts always will be directed to giving you the best service we can for the fare paid. But, that you may be fully advised, before you make your decision, I am directing this open letter to you.

The road "Relief" is paved with a higher fare and leads to satisfactory and efficient service, the kind of service a growing community should have. At present that road is blocked, but you, through your representatives in the City Council, can remove the obstruction. Adoption of an ordinance permitting us to charge a higher fare will open that road and it will not be necessary to take the "Retrenchment" route.

If we are compelled to adopt a policy of retrenchment we shall not be able to give you the kind of service we want you to have, or to which you have been accustomed. We will scrupulously observe all franchise requirements and will not neglect the public safety, but it will be necessary for us to effect such economies as will enable us to operate safely within our income.

"RETRENCHMENT"

A policy of "Retrenchment" will require the closing of the Campbell Street Power Station, which, though good of its kind, is not efficient, measured by present-day standards. This will necessitate a reduction in service, because our power supply with the Campbell Street Power Station closed is sufficient to operate only about 75 per cent of the cars now run during rush hours.

Closing the Campbell Street Power Station and the consequent reduction of service will throw out of employment about 200 of our men.

We will be unable to effect the entire operating economy necessary under a policy of retrenchment without largely modifying and restricting the present universal transfer system.

I know this deficient service is not the kind you want. I believe that the great majority of Louisville citizens want the best possible street car service. I am assured by people in all walks of life that this is true. I believe you want us to take the road marked "Relief." I believe you are convinced that the good of your city demands relief for your street car service. These representative citizens among others have assured me that they favor immediate relief for the Louisville Railway Company and have authorized me to use their names in this letter to you.

LOUISVILLE'S PROBLEM AS OUTLINED BY MR. BARNES

Failure on the part of the City Council to cope with the local traction situation is responsible for the company's present plight. Although the granting of a higher fare has been repeatedly urged, the Council has taken no definite action. Three ordinances, providing for a 7-cent fare in one form or another, have been introduced, but there is little prospect of the enactment of a constructive measure in the near future. The Council is apparently seeking to avoid putting itself on record on the question.

Unsuccessful in its efforts to secure a higher fare from the Council, the company has appealed directly to the public. Mr. Barnes has addressed an open letter to the people of the city in which he puts the settlement of the traction situation squarely upon their shoulders. "January 1, 1921, must find your street car service on one road or the other—relief or retrenchment," says Mr. Barnes, and continues, "The decision rests with you through your representatives in the City Council. Which road shall we take?"

In his open letter, published in the Louisville newspapers in the form of an advertisement, Mr. Barnes declares that "the experience of the last five months demonstrates that we cannot continue, on the present basis of operation, to give you even as good service as you are getting now." He names many prominent citizens and nine civic and business organizations as favoring a square deal for the railway. Mr. Barnes' summary of the alternatives which confront the Louisville system is published above.

Transfer Charge Authorized

The Public Service Commission of Indiana on Dec. 18 authorized the Indianapolis Street Railway to charge 1 cent for each transfer. This transfer charge was made effective Dec. 20, for a period of seventy-one days. It is intimated in the order that further relief will be granted if this does not prove sufficient. The basic 5-cent fare is retained. The railway had petitioned for a 2-cent transfer charge, and hearing on this petition, as well as a supplementary petition in relation to increased charges for track rentals and terminal facilities furnished to interurban companies, were held before the Commission.

Will Continue Service

Connecticut Company Will Not Stop Cars in Waterbury at Present—Fare Reduction Refused

Despite a daily loss of $400 on its Waterbury city lines, the Connecticut Company will continue service in Waterbury for the present, according to Lucius S. Storrs, president of the company. The daily receipts from the local lines during the ten-day trial period agreed upon at a recent hearing before the State Public Utilities Commission were only about $4,000. Connecticut Company officials maintain that at least $4,400 is required to meet the operating expenses of the Waterbury Division. It is expected that an application for further restriction of jitney operation will be received by the Board of Aldermen from the company in the near future.

The Public Utilities Commission has rejected the petition of the Hartford City Council for reduced rates for factory workers, shoppers and insurance employees. The commission has also rejected a petition of the city of New London for a fare lower than the straight 10-cent fare now charged. The orders containing the commission's decision are signed by Chairman R. T. Higgins and Commissioner Joseph W. Alsop. There is attached to each order the following note signed by Commissioner C. C. Elwell, who dissented from his colleagues previously when they approved the fare increase to ten cents:

"I can see no reason at this time for granting a lower rate of fare for the city of Hartford (or for the city of New London) than has been established on other lines of the Connecticut Company and therefore concur in the conclusion denying the petition."

MUST GIVE GOOD SERVICE

While refusing trolley service at lower cost, the commission in its order calls upon the company to give the public satisfactory service. In this connection the commission says: "With the installation of the maximum 10-cent flat fare, however, the respondent is warned and directed to supply adequate and dependable service as far as possible within the ultimate limitation of its physical and financial powers."

The commission states in its references to the Hartford petition that the crucial problem at this time is to establish a temporary maximum rate to enable the company to continue to operate its cars until a more definite and equitable policy is determined, following possible legislative action. The commission states in regard to the New London petition that having prescribed a 10-cent rate for other cities it finds no dominating reason why a distinction should be made in this case.

The fare on the Connecticut Company's lines between Hartford and Manchester has been reduced from 30 cents to 20 cents and the short or middle zone has been eliminated. Announcement to this effect was made by the Board of Selectmen of the town of Manchester.

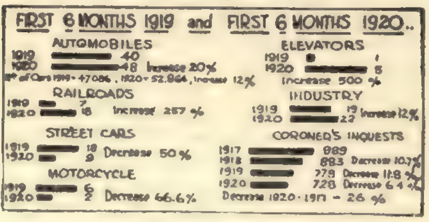
Unique Safety Exhibit

United Railways of St. Louis Equips Special Car to Teach Cost of Accidents

The United Railways of St. Louis, Mo., in an effort to further the "safety first" campaign of the Central Mississippi Valley Division of the National Safety Council, has equipped one of its special cars with an exhibit of artistic posters and other data, prepared for the most part by pupils of St. Louis public schools, on accidents, their causes and results. The exhibit is intended as a pointed warning to pedestrians and vehicle drivers of the uselessness and great economic waste of carelessness.

The seats have been removed from the car and the posters and placards arranged along both sides of a rack extending the length of the car. At the front entrance is a map of St. Louis prepared by the Safety First Bureau of the St. Louis Chamber of Commerce, in which are push-pins and thumbtacks, showing the number and location of accidents during the month of August, 1920. The type of accident is indicated also, the color of the push-pin showing whether the accident was fatal, caused an injury or merely resulted in property damage. At the end of each month a photograph of this map is taken by the Safety Bureau and filed among its records.

SAFETY-EXHIBIT CAR USED IN ST. LOUIS



FATAL ACCIDENTS IN ST. LOUIS
(Six Months Ended June 30, 1919 and 1920)

Almost every kind of accident that could happen in traffic is touched on either in the posters or in placards, in all of which gross carelessness is shown as the underlying cause. Employees of the company distribute copies of the city traffic ordinances, rules and regulations and pamphlet warnings to guide the readers safely through the maze of downtown vehicular traffic.

The exhibit was first shown to the public on a dead track in the heart of downtown St. Louis and proved to be of much interest to the public. As long as the car remained there the exhibit was constantly visited by large crowds. Later the exhibit was brought to the vicinity of various public schools, the principal of each school being notified when the car would be near his school. All the principals have arranged to have every child in their schools visit the exhibit. Wherever the car has gone it has aroused a great deal of interest and officials of the Safety First Bureau consider it one of their most effective means to educate the public to the value of the "safety first" idea.

The number of accidents involving the company's cars has shown a marked decrease. During the first six months of 1920 nine persons were killed in electric railway accidents in St. Louis, against eighteen for the same period of 1919. In September, 1919, there were four fatal accidents, two of the victims being automobilists who had head-on collisions with electric cars, while the other two were pedestrians. In September of the present year there was only one fatality, the victim being an automobilist whose car collided with a trolley car.

Just what an accident outside the collision class may mean to the United Railways was strikingly brought home to the employees in a recent memorandum sent by Colonel A. T. Perkins, general manager for the receiver, to H. O. Butler, superintendent of transportation. Colonel Perkins said:

> On the general claim agent's report to me for Oct. 2, covering settlements made on Oct. 1, is the following:
> Julius Rohde, $3,250.
>
> This man was a passenger on a rear platform and was thrown from the car as it rounded the curve, conductor having left the rear door open. He is sixty-eight years of age and sustained a fractured skull and a severe injury to the right shoulder and left leg, resulting in a permanent impairment of these members of the body. . . .
>
> The settlement of $3,250 alone will take the net income on the August, 1920, basis, from 2,321,430 passengers. Or, taking it another way, it will take all the net income from 40,625 car hours. If a car should be in the service sixteen hours per day, every day steadily without being in for repairs, it would take it seven years to pay the amount of this settlement.
>
> I suggest you put the above facts before your superintendents, foremen, and supervisors. We cannot keep in our employ men who are going to waste life and property, and who are going to destroy the resources from which their fellow-employees can be paid, in this manner. Our officers must watch this hereafter with the greatest care.

A CAMPAIGN POSTER

INTERIOR OF EXHIBIT CAR

Sweeping changes in the present system of handling traffic on the city streets and dealing with those apprehended for violating the traffic rules and regulations will be recommended to the Board of Aldermen within a short time by City Counselor Charles H. Daues. It is reported that a new traffic ordinance is being prepared for submission to the Board of Aldermen.

Milwaukee Case Remanded

Wisconsin Supreme Court Defines Interurban Service as Service Differing in Kind from City Operation

In a decision handed down on Dec. 14, in the case of the city of Milwaukee vs. the Milwaukee Electric Railway & Light Company, the Supreme Court of Wisconsin defined passenger street car service and passenger interurban service upon a basis of difference in the service rendered while operating within city limits, rather than upon the basis of the origin and destination of the cars.

The decision was on an appeal from an opinion of the Circuit Court of Milwaukee County holding in substance that the defendant company could not operate cars in the city of Milwaukee in connection with its interurban service or deliver freight over its city lines, unless it held franchises for these specific purposes from the city.

The Supreme Court upheld the decision of the Circuit Court that the city of Milwaukee was entitled to an injunction restraining the company from carrying freight across city limits without first obtaining a franchise. Judgment was reversed and the case was remanded for a new or further trial, however, in order to determine whether the company is rendering interurban service within the city as now defined by the Supreme Court, and, if so, on what lines and between what points. The rendering of such a service by the company would presumably necessitate the company obtaining an interurban franchise from the city.

CITY ASKED INJUNCTION

The case originated about three years ago in the contention of the city of Milwaukee that the Milwaukee Electric Railway & Light Company was making a use of the city's streets not warranted by its franchise, in that it was operating an interurban service and carrying freight. The city contended that additional franchises were necessary for these purposes. An agreement not being reached, the city asked for injunctions restraining interurban and freight traffic. These were granted on Jan. 13, 1920, after a trial of the action by the Circuit Court of Milwaukee County. A ninety-day stay of proceedings was granted by the court on Feb. 5, 1920, pending efforts by commercial and civic organizations of the city to obtain an amicable adjustment. When this failed, interruption of interurban traffic was prevented by the State Supreme Court issuing a stay of execution in the case, exercising its right of original jurisdiction. The entire matter was then brought before the Supreme Court for review.

In its original opinion the Circuit Court defined an interurban passenger as one whose passage starts at a point within the city for a destination outside of the city limits or vice versa. Based upon this definition of an interurban passenger, it found that interurban service was rendered wherever an interurban passenger was carried. In this it seems to have followed the reasoning adopted by the Wisconsin Supreme Court in previous similar cases which have come before it.

In the present case, however, the State Supreme Court decided to define passenger street car service and passenger interurban service upon a basis of difference in service rather than upon a basis of the origin and destination of the cars. In defining urban and interurban service the court held as follows:

> Urban surface street car passenger service is the transportation of passengers in suitable cars over the streets of a city operated so as to permit them to enter and leave the cars at reasonable intervals. The initial point from which the car or passenger comes or the point to which they are destined is immaterial. The criterion is the character of the service rendered by the car while on the city streets. If that is an ordinary or reasonable street car service as to fitness of car, rate of speed and frequency of stops for passengers to enter and leave, then while on the city streets such service is street car service though the car may come from or enter interurban service on the same trip.

The court, therefore, concluded:

> The operation upon an urban surface street railway by the owner of the franchise therefor of cars reasonably suitable for street car service, and which give street car service in such manner as the railroad commission may prescribe, or, in the absence of regulations by the commission, give reasonable street car service, does not subject the adjacent property within the city limits to an additional servitude though such cars may start from or be destined for points outside the city limits or be used in strictly interurban service outside of the city limits; and the operation of such cars within the city limits does not require any franchise additional to the urban surface street car franchises.

As was pointed out above, the judgment of the Circuit Court, in so far as it involved the interurban controversy, was reversed and the case was remanded for further trial. This will probably be held within a month from the date of the court ruling.

Service Improvement Sought

Notice has been served on the International Railway and the Buffalo & Lackawanna Traction Company by the City Council of Buffalo, N. Y., that an action will be started to revoke their franchises unless they comply with the city ordinances regulating service and franchise obligations. Among the more important franchise obligations which neither company is complying with is establishment of half hour owl service and ten-minute service throughout the day on all lines. During the war both companies were allowed to curtail unprofitable service.

The matter was brought up in the Council meeting by Frank C. Perkins, the Socialist member of the board, and was adopted, without a vote in opposition.

The City Council has given the two companies no specific date upon which they must start to give service as required by their franchies, but the Corporation Counsel has been authorized to bring suit against the companies to revoke their franchises if proper service is not started within a reasonable period of time.

Seattle Fare Advanced

After Considerable Bickering Emergency Measure Is Put Through Making Rate 8⅓ Cents

By a vote of five to two, the City Council has passed an emergency ordinance providing for the increase of fares on the Seattle Municipal Railway from 6¼ cents to 8⅓ cents, effective in thirty days, or on Jan. 8. Mayor Hugh M. Caldwell has approved the measure.

In the meantime, the payroll for the period ended Dec. 10 was taken care of by payment from the bond interest fund of $250,000. The payroll was $139,000. Payment from this fund prevented the treasurer's office putting the lines on a warrant basis, with a subsequent discount of the warrants from 10 to 15 per cent by the local banks. The situation had become a critical one, with the payroll due, and no funds with which to meet it. Representatives of the union had stated that some of the railway employees had determined not to appear for work unless the warrants could be cashed without discount.

It is possible that the next payroll will be taken care of in a similar manner, although it is considered likely that with the passage of the new fare ordinance, the city treasurer will honor the city's demands, on the assumption that the lines will shortly be on a paying basis.

Persons who bought railway tokens in anticipation of an increase in fare will fail to profit, as the Council has included a provision in the ordinance whereby a new set of tokens will be manufactured. The old tokens will be convertible at the rate of four for three of the new ones.

In order to match the fares on the municipal railway the Seattle & Rainier Valley Railway has filed a new 8⅓-cent fare schedule with the Public Service Commission, to become effective on Jan. 1. The proposed 8⅓-cent fare is effective only within the city limits of Seattle. Transfers to and from the Seattle municipal system are abolished except on cash fare. This is fixed at 10 cents. Under the present schedule, transfers are issued with token fares for the payment of 2 cents additional.

A Small Railway—A Big Job

A transportation stunt performed by the Holyoke (Mass.) Street Railway has only recently come to light though four months have elapsed since its accomplishment. The American Writing Paper Company desired to hold an outing at Riverside Park, about 15 miles from Holyoke, for its employees. At the request of that company the Holyoke Street Railway arranged to transport 6,000 people from Holyoke to the park and return. This entire number was transported from the center of Holyoke and landed in the park within 2½ hours. The first 1,000 arrived there fifty-seven minutes after leaving Holyoke. The job required forty-five fifteen-bench open cars and fifteen semi-convertible cars. With the assistance of the transportation committee of the American Writing Paper Company the crowds were loaded and unloaded with military precision at the rate of 1,000 every ten minutes. On a system operating regularly only about twenty-five cars the handling of the crowd was a real feat in mass transportation. The 6,000 people were handled without interfering with the regular service and without accident of any kind to equipment or passengers. In the words of the American Writing Paper Company the performance was regarded as "a transportation masterpiece" by those who had the good fortune to witness it.

Chamber of Commerce Wants Jitneys Regulated

The special committee appointed by the board of directors of the Chamber of Commerce of Providence, R. I., to investigate the conditions of the jitney service in that city and to ascertain if such service should be regulated, and if so the extent and character of such regulations, has submitted a report recommending that steps be taken to regulate the buses. The report is as follows:

> Your committee organized shortly after its appointment and discussed the situation. It was agreed that every member of the committee should independently investigate and report his conclusions at a meeting to be held at the call of the chairman. As a result of this investigation your committee finds:
>
> 1. That great necessity exists for the regulation of the jitney service so called in order to protect the safety and convenience of the traveling public of the city of Providence.
>
> 2. That such regulations should be made by ordinances or special laws to be passed by the city of Providence.
>
> 3. That such ordinances or special laws should provide:
>
> (a) That every person, company or corporation operating a motor vehicle for the transportation of passengers for hire should first file with the City Treasurer a bond with sufficient surety or sureties, based in amount upon the seating capacity of the service of such individual or company to pay all damages to person or property because of the negligent act of the principal named in said bond or his agents, employees or drivers.
>
> (b) That every person operating a jitney as so called should be more than twenty-one years of age and should be obliged to take out a chauffeur's license to be issued only to those who demonstrate their qualifications for the position of driver.
>
> (c) That routes should be established and a time schedule fixed on which the jitney service on such routes should be compelled to operate.
>
> (d) That the enforcement of said ordinances be made a part of the duty of the Police Commissioners of the city of Providence.
>
> Your committee finds that the jitney service as at present operated is extremely dangerous and believes that the public should be safeguarded by the above regulations and others that may be found to be necessary for the same purpose.

By unanimous instruction of the board of directors of the Chamber of Commerce, Clarence A. Cotton, general secretary of the chamber, has transmitted to the City Council a copy of the report of the special committee making recommendations with regard to the condition of the jitney service in Providence. The recommendations contained in the report met with the unanimous approval of the members of the board.

Street Collection in Newark

The Public Service Railway of New Jersey has put into effect a prepaid fare plan to facilitate the handling of passengers at congested points in Newark during the evening rush hour. Agents of the company are stationed at safety isles along Broad Street, in front of railroad stations and at busy points in Market Street. They accept the fare from passengers, issue receipts, and the passengers hand these receipts to conductors in lieu of money. The plan eliminates the handling of money by the conductor, except for transfers, and cars are filled in much shorter time than formerly.

The plan has worked successfully at the company's terminals in Weehawken and Camden. Each receipt will be stamped with the date of its issuance and cannot be used on any other day. If a passenger is unable for any reason to use the receipt after purchasing it he can redeem it at the Public Service terminal. In announcing the new plan the railway used the above advertisement in the Newark papers.

To Street Car Riders

Pay Fares, Get a Receipt
and Save Time

BEGINNING DEC. 10

At heavy traffic points, such as Tube Station, Railroad Stations and Safety Isles

To save time and speed up service during Evening Rush, from 4 to 6:15 Daily

Agents will receive fares before passengers board cars.

Receipts will be issued.

Conductors will accept Receipts in lieu of cash fares.

Change-making delays avoided.

The Get-a-Receipt Plan is working fine at Weehawken and Camden Ferry Terminals

With your co-operation it will SAVE TIME FOR YOU.

Try it, beginning Friday, on your way home.

Receipts good only on date of issue. Unused receipts are redeemable.

Public Service Railway

"AD" EXPLAINING COLLECTION PLAN

Can Legislate Against Buses

According to an opinion submitted by Walter F. Meier, Corporation Counsel, to the City Council of Seattle, Wash., that body now has the right to pass new legislation barring jitney buses from the streets entirely. The report states that the fact that the Superior Court has disposed of the suit against the city by the jitney bus interests clears the way for any action the Council might wish to take, the appeal of the jitneurs to the Supreme Court not constituting a legal bar to further legislation regulating or abolishing the buses, even though the temporary restraining order against the city is still in force.

Councilmen who favor complete prohibition of jitney operation have made no forecast as to what action may be taken by the City Council. In his report, Corporation Counsel Meier informs the Council that if it desires jitneys to continue operation unregulated during the time the appeal to the Supreme Court is pending, it may permit such unregulated operation by refraining from further legislation. On the other hand, if the jitneys are to be regulated, or refused permission to operate at all, there is no legal impediment to the repeal of the present ordinance, and the enactment of an ordinance containing such provisions as may be deemed proper in the premises.

"Readiness to Serve" Rates Suggested

Introduction of the "readiness to serve" principle in connection with the fixing of electric railway rates was suggested by City Attorney P. T. Peterson of Lincoln, Neb., in a brief filed recently with the State Railway Commission. Mr. Peterson took action to oppose an increase in fare by the Lincoln Traction Company from 7 cents to 8 cents, with a 5-cent charge for each transfer. The railway recently petitioned the commission to allow the higher fare as an emergency measure. Hearing on the application began before the commission on Nov. 18.

Mr. Peterson contends that a reduced rate should be allowed by establishing a fare zone with a radius of 1 mile measured from the center of the city. He believes that serious consideration should be given to the matter of a "readiness to serve" charge. This is mentioned in connection with the use of automobiles by persons who seldom use the electric cars. Mr. Peterson asserts that the laboring man who uses railway service every day ought not to have his burden increased in order that the automobile user may have a street car ready on rainy days or days when his machine is in the repair shop. Such a service charge may be worked out, he claims, on a basis of a monthly ticket, to be sold at a reduced price.

Would Raise Zone Rates

The Cortland County Traction Company, Cortland, N. Y., on Nov. 30 asked the Public Service Commission, Second District, for authority to charge a cash fare of 7 cents, and a 6¼ cent ticket fare in each of its zones and to increase the school fare rate from 3 to 4 cents without changes in transfer privileges. The fare is now 5 cents in each zone. Transportation revenues for the past nine months, the company shows, are $83,687. Its operating expenses and taxes amounted to $84,510, showing a deficit in operating expenses and taxes over revenues of $823. The fixed charges amount to $13,288, and the total capital used in the operation of the road on which the company is entitled to a return is $587,791.

Transportation News Notes

Fare Increase Denied.—An application of the South New Orleans Light & Traction Company, Algiers, La., for permission to raise its fare from five cents to 8 cents, has been denied by the police jury of Jefferson parish. The company serves the towns of Algiers and Gretna. The railway's employees recently went on strike for an increase in pay.

Traffic Survey at St. Paul.—The city of St. Paul is planning a comprehensive scheme of expansion for a period of at least ten years ahead. As the zoning system is developed in that city and new districts are made new transportation facilities will be provided. The board planning these improvements will spend $2,000 on a survey of the local transportation requirements.

"Trolley Topics" Revived.—The publication of *Trolley Topics* was resumed on Dec. 15. Hereafter it will appear on the first and the fifteenth of each month. This publication, devoted to the interests of Louisville Railway's employees, makes an appeal for a friendly interest and co-operation "so that a better understanding of our mutual problems may be reached, to the end that the best service may be rendered the public."

Ten-Cent Fare in Sharon.—The Shenango Valley Traction Company, a subsidiary of the Pennsylvania-Ohio Electric Company, Youngstown, Ohio, put into effect on Dec. 12 a new schedule of fares as filed with the Public Service Commission of Pennsylvania on Nov. 12. Under the new schedule the cash fare is increased from 7 cents to 10 cents and the ticket rate from six tickets for 40 cents to six tickets for 50 cents, with no charge for a transfer. The lines of the company serve the city of Sharon and the boroughs of Farrell, Wheatland, Sharpsville and West Middlesex, all in Mercer County, Pennsylvania.

Unable to Increase Service.—Preston S. Arkwright, president of the Georgia Railway & Power Company, Atlanta, Ga., has filed with the State Railroad Commission the company's plans for improvements in service required by the commission when it granted the company an increase in fare on its Atlanta lines to 7 cents. At the same time Mr. Arkwright asked that the commission's requirement of a flat increase of 20 per cent in service be modified considerably, stating that the railway is not able to provide the additional equipment required. He further pointed out that the number of passengers hauled by the company was gradually decreasing.

Will Continue 7-Cent Fare.—The Missouri Public Service Commission has granted the request of the United Railways of St. Louis that it be allowed to charge 7 cents for an additional six months. The extension of time will commence Dec. 31, 1920. The ruling applies to lines in St. Louis County and the line to St. Charles as well as to the St. Louis city lines. Rolla Wells, the receiver, in his petition asked that the company be permitted to charge the 7-cent rate until the commission completes a valuation of the company's property. James L. Harrop, chief engineer for the commission, has made the valuation, it is said, but it is being analyzed by company and city engineers. C. E. Smith, consulting engineer of the city of St .Louis, has stated he expects the valuation will finally be settled in court, which will probably require three years.

Will Give Cars "Once Over."—Plans have been mapped out by the International Railway, Buffalo, N. Y., for the systematic overhauling of its equipment. Kenneth R. Lewis, formerly general car inspector of the Hudson & Manhattan Railroad, New York, now superintendent of equipment of the International, has charge of the job. Herbert T. Tulley, president of the International, states that there was no systematic plan for caring for the equipment for some time prior to the time the new management came into control under Thomas E. Mitten. "We have given each car a date for being completely overhauled," said Mr. Tulley. "It will take about two weeks to go through the process. Every car will be inspected as to sills, frames, trucks, wheels and motors and repairs will be made wherever necessary. Cars then will go to the scrub rooms where they will be thoroughly cleaned and then to the paint shops for repainting."

More Time Desired to Install Cars.—Rolla Wells, receiver for the United Railways, St. Louis, Mo., has asked the Public Service Commission to extend until the latter part of next March, the time within which the company must put in service fifty new trail cars. On May 20 last the commission ordered the railway to put the first of fifty new trailer cars in service by the last of November and to continue to put the cars in service at the rate of two each working day until the full quota was in service. Thomas E. Francis, appearing for the receiver, said that the contract to construct the cars was let July 14. A fire on Oct. 11 partly destroyed the plant of company which was building the cars together with a number of cars which were almost completed. Mr. Wells has asked the commission, in addition to extending the time of delivery, to permit the cars to be placed in service at the rate of two a week instead of two a day thereafter.

Jitneys Cause Big Loss.—The Springfield (Mo.) Traction Company is experiencing a serious inroad upon its revenue by unfair jitney bus competition, according to a recent statement by E. C. Deal, general manager of the company. Cash fares for November of this year, he says, fell 54,581 below the same month last year and about the same slump is being experienced up to date this month; in fact a decrease in riding has been noticeable for about six months. This is due to the operation of buses which, the company claims, are improperly routed and thereby are securing business along the car lines while other parts of town suffer for the want of local transportation facilities. The company claims that this unfair jitney bus competition, together with the large wage increase of last June, has reduced the net earnings until the company is in a precarious situation and must take immediate steps to find relief, it being necessary that this relief be realized not later than January 1.

Express Service Pays Well.—Development of the electric express business in the industrial and agricultural territory covered by the Reading Transit & Light Company, Reading, Pa., has proceeded so favorably during the last few years that it has been found necessary to increase the terminal facilities of the Reading Division for this service. Improvements recently completed at the company's property at the foot of Third Street, Reading, at a cost of approximately $5,000, are such that this terminal will be able to take care of increasing business for the next ten years. Nine large double-truck cars and one single-truck car are now used daily to carry on the express business of the Reading Division. In 1917 the equipment consisted of one single-truck car and one combination passenger and express car. Electric freight and express service was put into operation on Oct. 15 on the Lebanon Division of the company. Two trips are made daily between Lebanon and Myerstown, and two between Lebanon and Palmyra. It is planned to extend this service.

City Fare on Interurbans Increased.—Passengers on interurban cars riding into the Public Square of Cleveland, Ohio, will have to pay 10 cents for their ride inside the city limits. This is as a result of the Cleveland City Council authorizing a 10-cent rate of fare to be charged these riders. The Council was told by Street Railway Commissioner Sanders that operation of the interurban cars inside the city limits of Cleveland has been costing the Cleveland Railway $100,000 a year. Several years ago the interurbans obtained passage of an ordinance making it unnecessary for their cars to stop to let off passengers within the city limits. Traffic on the interurban lines, particularly to Akron, Elyria, Lorain and other points west and south of the city is very heavy, and Cleveland Railway officials expect the higher fare to increase the company's receipts very appreciably unless an unexpectedly large number of interurban riders change to the city cars at the city limits. All fares collected on the interurban cars inside the city limits go to the Cleveland Railway.

Personal Mention

Foster Hannaford to Leave Traction Field

Foster Hannaford has tendered his resignation as general manager of the Twin City Rapid Transit Company, Minneapolis, Minn., to take effect on Jan. 1, 1921. On that date Mr. Hannaford will assume the duties of vice-president of the firm of Noyes Brothers & Cutler, a wholesale drug company of St. Paul. Mr. Hannaford's successor with the Twin City Rapid Transit System has not yet been appointed.

Mr. Hannaford is a native of St. Paul. Following his graduation from the Sheffield Scientific School, Yale University, he was employed for two years in the Westinghouse shops in East Pittsburgh, Pa. He then went abroad to round out his technical education, spending a year at the University of Karlsruhe, Germany. Upon his return to the United States he spent a year as superintendent of substations of the Illinois Traction System. He was then appointed chief engineer of the McKinley power station in St. Louis. Later he went to Galesburg, Ill., as operating engineer of the Galesburg Railway, Light & Power Company. He was subsequently made general superintendent of the company. In 1916 he was appointed superintendent of the St. Paul City Railway. Three years ago he became general manager of the Twin City Rapid Transit Company.

New Honor for Mr. May

I. A. May, comptroller of the Connecticut Company, New Haven, Conn., and president of the New England Street Railway Club, has been appointed by Governor Holcomb to be a member of the State Board of Accountancy for a term of three years, succeeding George L. Vannais.

An accountant by profession, Mr. May has earned for himself a reputation as one of the leading authorities on the subject of electric railway accounting. His manual, "Street Railway Accounting," is regarded as the standard on the subject of which it treats.

Because of his extensive knowledge of the subject Mr. May has been president of the Connecticut Society of Accountants, ex-president American Electric Railway Accountants' Association and comptroller for the Connecticut Company. He received a C. P. A. degree from the state in 1915.

Mr. Shoup Heads Oil Company

Paul Shoup, president of the Pacific Electric Railway, Los Angeles, Cal., and vice-president of the Southern Pacific Company, has been elected president of the Pacific Oil Company, which has been formed to take over California oil properties of the Southern Pacific. Because of the extensive nature of the Southern Pacific's oil holdings, it was recently decided to segregate the oil and railway properties and to develop the former independently.

Mr. Rolston in Iowa

Resigns as Superintendent of Power, Kansas City Railways, to Join Sioux City Company

William E. Rolston will on Jan. 1 become superintendent of power of the Sioux City (Iowa) Service Company. For the past year Mr. Rolston has served as superintendent of power of the Kansas City (Mo.) Railways, and has been in charge of the extensive reconstruction program of that company's power plant. The department now headed by Mr. Rolston will be combined with the electrical distribution department, and all matters, both generation and distribution, will be handled directly under the supervision of R. W. Bailey, assistant general manager for the Kansas properties, who has jurisdiction over electrical distribution.

W. E. ROLSTON

Before joining the Kansas City Railways in December, 1919, Mr. Rolston was superintendent of power and equipment of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind. He was graduated from the Armour Institute of Technology in 1898. Three years later he joined the Dayton & Troy Electric Railway. During his connection with that company, which lasted five years, he served first as chief engineer of power plant and later as superintendent. In 1906 he became superintendent of power and shops of the Canton-Akron Railway, Akron, Ohio, now included in the system of the Northern Ohio Traction & Light Company.

In the following year Mr. Rolston was appointed superintendent of power and shops of the Cleveland, Southwestern & Columbus Railway, continuing in that position until 1911. He then became general superintendent of the Des Moines (Iowa) City Railway. Later in the same year he was made superintendent of the Inter Urban Railway, Des Moines, in addition to his connection with the city lines. In 1912 Mr. Rolston resigned from these companies to accept the position of superintendent of power and equipment of the Chicago, Lake Shore & South Bend, continuing in that capacity until his appointment at Kansas City.

C. M. Harris Joins Maryland Interurban

C. M. Harris, manager of the railroad shop section, industrial department, Westinghouse Electric & Manufacturing Company, has been appointed vice-president of the Hagerstown & Frederick Railway, Frederick, Md. In addition to operating more than ninety miles of interurban line this company controls and manages several central station properties.

During the past four years Mr. Harris has been in charge of all industrial engineering and commercial sales for the Westinghouse Company, including all steam and electric roads in the United States. Most recently he has assisted in the survey made by the Westinghouse company for the electrification of the main line of the Baltimore & Ohio Railroad between Keiser and Grafton.

Mr. Harris was graduated from Pennsylvania State College in 1901. Shortly thereafter he entered the employ of the Pennsylvania Railroad in the motive power department at Wellsville, Ohio. Leaving the Pennsylvania in the following year, he joined the Baltimore & Ohio as assistant engineer in the motive power department at Baltimore, Md. Two years later he was appointed assistant master mechanic, Mount Clair shops, Baltimore, and in 1906 he was promoted to assistant general superintendent of the motive power department. In 1907 Mr. Harris was appointed mechanical superintendent with charge over all mechanical and electrical work in connection with the building of the union terminal, Washington, D. C.

Mr. Harter Resigns

Russell Harter, assistant to A. C. Blinn, vice-president and general manager of the Northern Ohio Traction & Light Company, Akron, Ohio, has resigned to become vice-president and general manager of the Babcock Ohio Company with headquarters in Cleveland. Mr. Harter entered the employ of the N. O. T. & L. Company as a stenographer in July, 1911. He was later made purchasing agent. Two years ago he was appointed assistant to the general manager.

Board Members Well Qualified

Appointees to Toledo Board of Control Have Public's Confidence—All Active in Civic Affairs—H. C. Truesdall, Chairman

A banker, a manufacturer and an engineer make up the board of control recently appointed by Mayor Cornell Schreiber of Toledo, Ohio, to supervise the carrying out of the new service-at-cost agreement under which the city's traction system is to be operated. Fitness for their work rather than any consideration of a political nature was the chief factor governing their selection. To preserve the non-partisan character of the board it is provided that, while the basic term of the members shall be six years, the first two appointees shall serve for two and six years respectively. Henry C. Truesdall, William W. Knight and David H. Goodwillie, the present members, have already distinguished themselves for their service to the community, and may be said to have the undivided support of the public. Their selection for the important task of bridging the transition from private to quasi-public operation has the approval of the commission which drafted the service-at-cost ordinance and has been well received by the people at large. Operation under the new plan will probably begin Feb. 1.

HENRY C. TRUESDALL is chairman of the board. Mr. Truesdall was appointed for the two-year term. He was born at Monroeville, Ohio, where he attended public school. His higher education was secured at Oberlin College, from which he was graduated with the class of 1894. He later took a law course at the University of Cincinnati, graduating from the college of law of that institution in 1897. He removed to Toledo, where he began the practice of law in conjunction with the firm of Brown, Geddes, Schmettau & Williams. Later he entered the banking business, in which he has been actively engaged for the last six years.

At the present time Mr. Truesdall is president of the Toledo Clearing House Association, vice-president of the Northern National Bank and president of the Union Savings Bank & Trust Company. He is directly interested in several other commercial and industrial enterprises in the city of Toledo and has been an active member of the Chamber of Commerce. Mr. Truesdall was called into conference on several occasions by the Milner commission which drafted the cost-of-service ordinance for Toledo, and gave valuable financial advice to the commission.

William W. Knight, appointed for the four-year term, was elected secretary of the board at its organization meeting. Mr. Knight was born in Indianapolis, Ind. He secured his early education in St. Louis, Mo., to which city his parents moved from Indianapolis. After attending Smith Academy in St. Louis, he matriculated at the Sheffield Scientific School, in Yale University, from which he was graduated in 1899 with the degree of Bachelor of Science. Going to Toledo he entered business with the firm of Reynolds Brothers, grain merchants. He remained with that company for five years, and then entered the Bostwick-Braun Company as its secretary. This company is one of the largest dealers in wholesale and retail hardware in this part of the country. Mr. Knight is now the vice-president of the company. He is also a director of the First National Bank of Toledo and of the Rossford Savings Bank, Rossford, Ohio.

Mr. Knight became very popular during the war as chairman of the local Liberty Loan organization, which brought Toledo to its quota first in the list of metropolitan cities on the third, fourth and fifth loans. He was also a member of the commission appointed by Federal Judge John M. Killits to draw up a service-at-cost franchise for the settlement of the city's street railway problem. With Chairman W. L. Milner of the commission he devoted considerable time to the ordinance and is given much credit for the practical, business-like provisions of the franchise measure.

David H. Goodwillie, appointed for the six-year term, has had considerable experience in public positions.

Mr. Goodwillie is a native of Oak Park, Ill. He was graduated from Cornell University as a mechanical engineer with the class of 1908. During the next two years he was assistant sanitary engineer with the American Steel & Wire Company, Chicago. In 1910 he went to Toledo to take charge of the construction of the city filtration plant, and during part of that year and the next he was superintendent of filtration. He was later made superintendent of waterworks for the city. Until 1916 he had an office as a private engineer and was employed on a number of industrial projects in the Toledo district.

On Jan. 1, 1916, Mr. Goodwillie assumed the position of Director of Public Service in the first cabinet of Mayor Schreiber. He served in this capacity until September, 1920, when he took a position as an engineer with the Ford Plate Glass Company at Rossford, a suburb of Toledo.

During his term of office as Director of Public Service he was named chairman of the committee to make a valuation of the railway property of the Toledo Railways & Light Company, and the committee's report is known as "the Goodwillie valuation."

Having finished the preliminary work of organization, the board has started business in earnest. The first important matter to come before it is the selection of a street railway commissioner. More than fifteen persons, many of them residents of other cities, have come forward as candidates for this position.

To aid the board in choosing a commissioner the board has called into consultation Prof. Henry E. Riggs, head of the civil engineering department of the University of Michigan, and has announced that additional applications will be received. Professor Riggs is one of the three men who served on the valuation board which fixed the price of the property of the Toledo Railways & Light Company before the ordinance was drawn by the cost of service commission.

H. C. TRUESDALL

W. W. KNIGHT

D. H. GOODWILLIE

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Recession in Price of Cotton Waste

Demand Light, but Supply Is Not Large, with Many Textile Mills Closed—Trolley Cord Prices Firm

As a result of light demand and the persistent downward price trend of raw cotton, which at this writing is quoted at 14½ cents for spot, the expected price drop on cotton waste has materialized. In 100-lb. bales white cotton waste is quoted at 10½ to 14 cents per pound, depending upon grade, in New York at present. Colored cotton waste is worth from 7½ to 12 cents.

Demand continues very light, with some buying from steam railroads, but little or none from electric lines. The supply is not large because of the continued shutdown and curtailed production of many of the textile mills. Were it not for the slump in buying it seems that a considerable scarcity would be felt, but as it is the waste supply is adequate to meet present needs, with deliveries of reasonable quantities from stock.

Trolley and bell cord prices show a firmer tendency at present. Buying is very light with a good supply available. The market on trolley and bell cord has held at from 66 to 85 cents per pound the last two weeks, depending upon the grade and the manufacturer.

Independent Rail Producers Meet Corporation Price

Lackawanna, Bethlehem and Midvale Drop Price $10 per Ton to $47 for Open-Hearth Rails

Announcement of a drop in steel rail prices to the level of the United States Steel Corporation by several of the leading independent producers this week is expected to go a long way toward establishing equipment buying of railroads on a firm basis. The action of the Lackawanna Steel Company, which had been previously quoting $57 a ton on standard T-rails, in reducing its price to $47 per ton for open-hearth steel rails and $45 per ton for bessemer has been followed by several other leading independent producers. The Bethlehem Steel Company, which recently fixed its price at $57 per ton for open-hearth rails covering the first quarter of 1921, has fallen in line, as has also the Midvale Steel & Ordnance Company, it is stated. Other independents are expected to make similar price cuts soon, but with this reduction of $10 per ton by three of the leading independents, it may safely be stated that the independent market for steel rails is now on a level with the Steel Corporation's price, which has all along held at $45 per ton for bessemer and $47 for open-hearth rails. These prices were those mutually suggested by representatives of the government and of the steel interests in March, 1919.

The largest rail inquiry now on the market is from the Pennsylvania Railroad for 200,000 tons. Half of this will go to the corporation, it is expected, and the remainder to the independents now that the price question has been settled. The new price level, following statements that independent steel companies could not produce rails under $57 per ton with profit, has been influenced to some extent, it is thought, by the determination of producers to make substantial wage cuts soon.

Window Glass Stocks Good at Present

With End of Present Production Season Coming in January Popular Sizes May Be Hard to Obtain

The car-window glass market is firm, although buying is somewhat limited. At the same time production is lower than it was in the fall and without doubt it will be still lower by the time the present period of manufacturing is at an end—about Jan. 15, 1921. Between then and the starting of the first period of 1921 blowing, about March 1, it is probable that stocks will be pretty well depleted, especially those of the popular sizes, and these will be hard to obtain. At the present time shipments of reasonable quantities of ordinary sizes and grades may be had from stock to three weeks' time.

There is little chance for any recession in price of car-window glass, especially in view of the demands made by the independent workers for a wage increase of 12 per cent. The meeting last week of the workers of hand-made manufacturing plants adjourned without reaching any decision, it is reported, and there will probably be little production turned out by them before March. This increase, were it granted, would provide sufficient reason for no reduction in price of glass.

Manufacturing is going on still to fill orders placed several months ago, so all present production cannot be turned to current requirements or to stock. A factor which might affect stocks appears from the direction of outside the country. It is probable, however, that only single-strength glass will be brought in, while it is double strength that more directly concerns traction companies. Conditions of gas fuel in Pennsylvania and West Virginia are an added detriment to high production.

Active Demand for Used Equipment

Cars, Trucks, Motors, Etc., Have Rapid Turnover—Locomotives and Express Cars Scarce

Dealers in used electric railway equipment report that a very active market exists for second-hand material at present. Many used-equipment dealers have got out of the electric railway end of the business in the recent past, it is true, but this seems to be due more to specialization along certain lines than to an absence of buying.

Important factors in the existing strong demand are the difference in cost and in the delivery period between new and old material. Financial embarrassment has caused many lines to enter the second-hand market rather than bear the greater cost of new material.

More supplies of all sorts are now available in the second-hand market following the extreme scarcity which developed during the war. One reason for this greater supply has been the standardization movement in equipment and another has been the growth of safety car operation, throwing more double-truck cars and equipment upon the market. Few really desirable cars remain there long, however, because a strong interest is shown in cars that can be equipped with safety appliances and converted to the one-man type. In fact the greater part of the buying in this market at present is said to be for one-man car operation. There is therefore an increasing number of the really old cars for sale, with a consequent decrease in buyers.

Railway motors have a rapid turnover, especially the good interpole types, and the supply is about as plentiful as that of cars. Used car trucks are very scarce and in strong demand. The supply of second-hand express cars is also greatly inadequate, while electric locomotives, in the face of the great demand in which they are held, are virtually unobtainable. So far as can be learned the number of second-hand locomotives available throughout the country recently could be counted on the fingers of one hand. A fair demand for rails has been felt on behalf of replacements, but the greatest volume of orders for used rails has come from the steam roads. Demand for power plant equipment, it is stated, has been steadily lessening with more material coming on the market.

Although a downward tendency to prices is seen in the second-hand equipment market there has been no price change as yet. Prospects for increased business next year are generally thought to be bright. A better buying feeling with traction companies is said to be evident, and with increased revenue making itself felt in many cases there will be more buying of new cars and equipment, with more discarding of old supplies which will yet find a ready market.

Easier Prices on Track Bolts and Spikes

Back Orders Being Reduced and Deliveries Improve Under the Present Quietness of the Market

In line with the lower prices of steel bars which are quoted by independent producers, as the disparity between the U. S. Steel Corporation prices and those of independents further disappears the price of track bolts and spikes has eased off still more. Not all independent producers have fully met the corporation's level, as with the latter at a 2.35-cent base on steel bars it is reported that the base price of some producers is as high as 3.35 cents. The range of independents' prices on standard railroad spikes, 9/16 in. x 5½ in., is from 4 to 5 cents, and on track bolts from 5½ to 6½ cents, depending upon the quantity.

The U. S. Steel Corporation is reported to have accepted a large order for standard railroad spikes recently at 3.65 cents.

Demand continues to slacken, and with the present quietness of the market manufacturers are mostly working on old orders. These are being reduced, however, and deliveries continue to improve. In some cases orders can be filled from stock but not all producers have been able to accumulate surplus stocks as yet. In these instances deliveries range to a maximum length of six weeks on bolts and four weeks on spikes. Optimism seems to prevail regarding the expected railroad demand in 1921.

Tape Producers See Promising Year Ahead

Present Orders Are Light with Good Deliveries—Slight Reduction in Prices Is Expected Soon

Despite recent declines in tape purchases manufacturers of both friction and compound tape will undoubtedly close the year with a large gain in total business handled over 1919. Deliveries are now easy as in many other lines. An optimistic tone pervades the market with regard to next year's sales, even though inquiries and orders are at present running low. It is felt that the necessities of the coming year will require the placing of substantial orders during the course of the twelve-month period. Some of these commitments may be small and others large, but in the opinion of leading sales executives little reason for pessimism exists.

Some reduction in prices is expected about Jan. 1, but it is hard to see how this can exceed 10 per cent in view of the continuing high cost of labor, fuel, transportation, whiting, sulphur and some other material. Sharp as have been reductions in cotton cost, these have been insufficient seriously to affect the manufacturing expense in friction-tape and rubber-tape production. Overhead costs continue at high levels and taxation burdens show small signs of material lightening. The outlook for immediate business is somewhat uncertain, but it is believed in manufacturing circles that easier prices will stimulate orders somewhat and that as soon as buyers realize the relations of various cost factors to current quotations better trade will be enjoyed.

Power Transformers Still on Long Delivery

Plants Working at Good Capacity and Stocks of High-Cost Materials Are Gradually Being Reduced

Although the demand for transformers is somewhat reduced as regards new orders in comparison with the business of last summer and spring, a substantial output is coming through the manufacturing plants. This class of apparatus appears less susceptible to trade fluctuations than many other products. In one of the larger transformer factories recently visited by a representative of the ELECTRIC RAILWAY JOURNAL practically full-time production was under way.

Raw material is coming into the factories at a better rate than for some time, although it is only within the past two or three weeks that conditions have been so good that output could be pushed without much fear of shortages disturbing production schedules. Even now no great excess of materials of all classes exists. Power transformers are not generally stocked, and deliveries here run from a normal of three to four months up to five or six months, depending largely upon the existence of back orders.

The future course of prices is not well defined as yet, although some of the materials entering into manufacture have been reduced. There are still stocks of raw materials to be worked up which were purchased in good faith at higher levels than prevail today, and there has been little tendency toward reduced labor costs in this field. Transformer manufacturers point out that at no time did prices follow the advance of raw-material costs to their peak, and the increases established were moderate in comparison with many commodities.

No very decided drop in quotations is anticipated for the immediate future. Much study is being given to the materials of transformer manufacture and the problem of obtaining insulating paper of a higher degree of dielectric strength is a live one among designing engineers. In some cases it has become necessary to purchase this material at prices comparable to the cost of the higher grades of writing paper.

Good Volume of Orders for Gear Cases

Deliveries, Though Long, Are Improving—Castings Still Scarce and Sheet Steel Stocks Are Kept Low

Although one or two manufacturers of gear cases report that demand is poor and electric railways are not trying to stock up, the majority of producers are making good sales. Many traction companies have taken the lesson of last winter to heart, it is stated, and are anticipating their needs for gear cases so far as is possible. Even where orders merely represent current needs the volume of buying is said to be a considerable total.

The need of advance orders for gear cases this winter is emphasized by prevailing long deliveries, though the latter situation is improving. Inability to obtain castings has been the chief difficulty in turning out the finished product. Foundries are now quoting better deliveries on castings but the supply is by no means favorable. Sheet steel is plentiful but some of the manufacturers of gear cases say they have purposely avoided stocking this material on the present declining market. Consequently the best delivery of the finished product that can be quoted ranges from forty-five to ninety days on malleable cases and thirty to seventy-five days on sheet steel cases. No orders have been canceled so far as could be learned and virtually no stocks of finished cases of any type exist with manufacturers.

A good volume of orders is yet expected to develop from lines that have only covered their present needs, and with the raw material supply improving and a constantly better attitude of labor evident it is hoped to reduce the time in which shipments can be made. Prices have held steady and among manufacturers there seems to be no indication of lower prices very soon, though sheet steel is lower. Malleable iron still costs the same.

Rolling Stock

Springfield (Mass.) Street Railway, in a fire on Dec. 12 which totally destroyed the carhouse on South Main Street, Palmer, lost four snow plows, three double-truck passenger cars and a work car. The loss is unofficially estimated at $150,000.

Track and Roadway

Phoenix (Ariz.) Street Railway.—The Corporation Commission has granted a two-year extension of time to the Phoenix Street Railway to double track West Washington Street from Seventh to Seventeenth Avenue. The railway asked for a five-year extension, basing its claim on war-time conditions.

Interborough Rapid Transit Company, New York, N. Y.—The White Plains extension of the Interborough Rapid

Transit Company was opened on Dec. 13. Trains of the east side subway and the Third Avenue elevated will use the extension. Transit Construction Commissioner Delaney has pointed out that the opening of this branch provides a ride of 26.19 miles between the northerly terminal and Livonia and Pennsylvania Avenues in Brooklyn.

International Railway, Buffalo, New York.—Construction work soon will be started by the International Railway on the double-tracking of the River road line between the Buffalo city line at Riverside park and the new plant of the Dunlop Tire & Rubber Company, a distance of about 1.3 miles. The new line will serve large industries locating in the River road district which will employ more than 15,000 men before next spring. Permission to construct the line already has been obtained from the town board of Tonawanda and the village of Kenmore.

Tarrant County Traction Company, Fort Worth, Tex.—The traction committee of the Cleburne (Tex.) Chamber of Commerce has secured an agreement with the Tarrant County Traction Company, which operates the interurban between Fort Worth and Cleburne, for improved service on this line. The company will purchase new cars and overhaul the old ones. Several additional cars will be put on and the schedule will be speeded up.

Texas Electric Railway, Dallas, Tex.—J. F. Strickland, Dallas, Tex., president of the Texas Electric Railway, has been asked by residents of Cleburne and Hillsboro to build an interurban line connecting these two points. Such a link would connect the line of the Tarrant County Traction Company, extending from Fort Worth to Cleburne, with the line of the Texas Electric Railway. It is understood that such an extension was being planned when the war came on and caused such financial stringency that the project was abandoned for the time and has not been taken up until now.

Bamberger Electric Railroad, Salt Lake City, Utah.—The running time on the Bamberger Electric Railroad between Ogden and Salt Lake City will be considerably reduced with the completion of the double-tracking between those two cities. This work is now in progress and will be completed soon.

Grays Harbor Railway & Light Company, Aberdeen, Wash.—The action of the City Council in granting permission to the Grays Harbor Railway & Light Company the privilege of temporary planking rather than putting in permanent pavement between tracks on South Aberdeen street has brought a storm of protest from residents of that district. Permission was granted to the railway when representatives appeared before the City Council and stated that it would work a financial hardship to put in permanent paving at this time. Suggestions were made that the company apply for an increase in fare, or that jitneys now operating be prohibited from running over the routes of the railway.

London, Ont.—The City Council of London will consider the question of the construction of a subway at Rectory Street and Engineer Mountain of the Dominion Railway Board will look into the question immediately.

Montreal (Que.) Tramways.—The Montreal Tramways Commission has instructed the Montreal Tramways to replace the track in two sections of St. Catherine Street between University Street and McGill College Avenue, which had been laid close to the sidewalk in a temporary arrangement.

Toronto, Ont.—Works Commissioner R. C. Harris has outlined the following improvement work for 1921: street railway on Bloon Street viaduct from Sherbourne Street to Broadview Avenue at a cost of $185,000, civic railway installation of insulated negative feeder cable, Danforth line, to prevent electrolysis, at a cost of $31,350.

Power Houses, Shops and Buildings

Monongahela Valley Traction Company, Fairmont, W. Va.—Ground has been broken for a new substation at Perry mines in Clarksburg, W. Va., by the Monongahela Valley Traction Company. The station will enable the company to operate three-car trains between this city and Fairmont, where two-car trains are now run.

Springfield (Mass.) Street Railway.—A carhouse of the Springfield Street Railway located in South Main Street, Palmer, was totally destroyed by fire on Dec. 12. Four snowplows, three double-truck passenger cars and a work car were among the contents burned. The cause of the fire is not known. The estimated loss is unofficially given at $150,000.

Northern Ohio Traction & Light Company, Akron, Ohio.—A new freight house built by the Northern Ohio Traction & Light Company in Akron will be occupied Jan. 1. The new building is 120 by 140 ft., two stories high, of concrete and steel construction throughout. The company owns considerable additional frontage adjoining the building and it is the intention to construct additional warehouse and freight facilities at this point.

Interstate Public Service Company, Indianapolis, Ind.—Plans are being made by R. J. Custer, engineer of maintenance of way, at Columbus, Ind., for the Interstate Public Service Company for the construction of general shops and carhouse at Scottsburg, Ind. The new construction work will cost approximately $300,000. All the buildings will be of brick and steel with steel sash and composition roofs. Contract will probably be awarded shortly after the first of the year.

Monongahela Valley Traction Company, Fairmont, W. Va.—Extensive improvements which will make it possible for the company to supply more electric power to its own lines in the Fairmont region and also to other concerns in that vicinity are being made by the Monongahela Valley Traction Company.

Trade Notes

The American Frog & Switch Company, Hamilton, Ohio, has opened a New York office at 149 Broadway in charge of Presley Hamilton and H. F. Whiteman.

The New York Car Wheel Company, Buffalo, N. Y., manufacturer of chilled iron wheels, will build a two-story addition, 34 ft. x 100 ft., to its plant at 15 Forest Avenue.

Frank O. Howard of the sales department of American Steel & Wire Company, North Works, Worcester, Mass., has been appointed general manager of the company's newly opened office at Atlanta, Ga.

The Jackson Railway Signal Company, Manasquan, N. J., has been incorporated with a capital stock of $100,000 to manufacture railway signals and devices. The incorporators are George B. Jackson, J. H. Sickel and J. S. Van Schoick.

The Automatic Reclosing Circuit Breaker Company, Columbus, Ohio, announces the appointment of the W. D. Hamer Company, 508 Traction Terminal Building, Indianapolis, Ind., as its representative in Indiana and western Kentucky.

The Line Materials Company, South Milwaukee, Wis., manufacturer of electric transmission supplies, recently suffered an estimated loss of $40,000 from fire in its assembling shop and office building. Two new concrete shop buildings that were recently erected will serve to keep operations from being curtailed.

G. D. Crain, Jr., 417 South Dearborn Street, Chicago, Ill., publisher, announces that "Crain's Market Data Book and Directory of Class, Trade and Technical Papers," which lists and gives the circulation, rates, type-page sizes, closing dates, etc., of all the business publications of the United States and Canada, is now on the press.

The Air Reduction Sales Company, manufacturer of welding and cutting apparatus, has completed a four-story brick extension with reinforced concrete floors to its plant in Jersey City, N. J. The addition is necessary to provide for increased production of the Airco "A" welding and "D" cutting torches.

New Advertising Literature

Condulets.—Crouse - Hinds Company, Syracuse, N. Y., is distributing bulletin 1000R, on condulets, fixture joint and extensions, effective Nov. 26, 1920.

Are Your Motormen Sure of Their Brakes?

If so, they are well prepared for any emergency

The confidence which results from the motorman knowing that he has a hand brake with which he can handle his car, is an asset which the railway can obtain only by the use of

PEACOCK Brakes

He is positive that in case his air fails, his hand brake will stop the car and accordingly, he fears neither a heavily loaded car as he is bound to get in the rush hour nor the steep grades that are encountered in many cities.

Don't delay. The cost of one accident will more than equip your entire system with Peacock.

"The Peacock Staffless"

National Brake Company
888 Ellicott Square, Buffalo, New York

Bankers and Engineers

Ford, Bacon & Davis,
Engineers.
115 BROADWAY
NEW YORK

STONE & WEBSTER
Incorporated
Design and Construct Steam Power Stations, Water Power Developments, Transmission Lines, Substations, Gas Plants.
NEW YORK BOSTON CHICAGO

SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
CHICAGO

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS

WALTER JACKSON
Consultant
FARES, BUSES, MOTOR TRUCKS
More revenue from *more* riders
143 Crary Ave., Mt. Vernon, N. Y.

C. E. SMITH & CO.
Consulting Engineers
2065-75 Railway Exchange Bldg., St. Louis, Mo.
Chicago Kansas City
Investigations, Appraisals, Expert Testimony, Bridge and Structural Work, Electrification, Grade Crossing Elimination, Foundations, Power Plants

HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
43 Exchange Place, New York

JOHN A. BEELER
OPERATING AND RATE INVESTIGATIONS
TRAFFIC SURVEYS AND SCHEDULES
MANAGEMENT - CONSTRUCTION - APPRAISALS
DIFFICULT WORK EXECUTED
52 VANDERBILT AVE., NEW YORK

J. L. JACOBS & COMPANY
Engineers—Statisticians
Investigations—Reports—Expert Testimony
Management, Organization and Cost Control
Industrial Relations Problems—Statistical Analyses
Monadnock Building, Chicago

ENGELHARDT W. HOLST
Consulting Engineer
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management.
683 Atlantic Ave., Boston, Mass.

ROBERT M. FEUSTEL
CONSULTING ENGINEER
Rate, Traffic and Reorganization Investigations
Fort Wayne, Indiana

REPUBLIC ENGINEERS, INC.
CONSULTING AND CONSTRUCTING ENGINEERS
Valuations *Reports* *Investigations*
Designs *Construction* *Management*
60 BROADWAY, NEW YORK
CLEVELAND, OHIO Illuminating Bldg.
YOUNGSTOWN, OHIO Mahoning Bank Bldg.

Parsons, Klapp, Brinckerhoff & Douglas
WM. BARCLAY PARSONS H. M. BRINCKERHOFF
EUGENE KLAPP W. J. DOUGLAS
Engineers—Constructors—Managers
Hydro-electric, Railway, Light and Industrial Plants, Appraisals and Reports.
CLEVELAND Leader News Bldg.
NEW YORK 84 Pine St.
PORTSMOUTH, VA. Ferry Bldg.

WE BUILD TRACKS
Construction—Maintenance—Rehabilitation
ENGEL & HEVENOR
Track Engineers—Contractors
220 Broadway, New York City

AMERICAN BRIDGE COMPANY
HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

Manufacturers of Steel Structures of all classes particularly **BRIDGES AND BUILDINGS**

Sales Offices

NEW YORK, N. Y. . . . 30 Church Street
Philadelphia, Pa. . . . . Widener Building
Boston, Mass. . . . John Hancock Building
Baltimore, Md. . . Continental Trust Building
PITTSBURGH, PA. . . . Frick Building
Buffalo, N. Y. . . . . . Marine National Bank
Cincinnati, Ohio . . . Union Trust Building
Atlanta, Ga. . . . . . Candler Building
Cleveland, Ohio . . . . . Guardian Building
Detroit, Mich. . Beecher Ave. & M. C. R. R.
CHICAGO, ILL. . 208 South La Salle Street
St. Louis, Mo. . Third National Bank Building
Denver, Colo. . First National Bank Building
Salt Lake City, Utah . . Walker Bank Building
Duluth, Minn. . . . . . Wolvin Building
Minneapolis, Minn. . . 7th Ave. & 2nd St., S. E.

Pacific Coast Representative:
U. S. Steel Products Co., Pacific Coast Dept.
San Francisco, Cal. . . . . Rialto Building
Portland, Ore. . . . . . . Selling Building
Seattle, Wash. . 4th Ave. So., Cor. Conn. St.

Export Representative: United States Steel Products Co., 30 Church St., N. Y.

A Man Who is Now in Maine *may be* The Man You Need in Texas

The man for the job—wherever he may be—can be located through the

SEARCHLIGHT SECTION

"SEARCHLIGHT" ads locate experienced men for responsible positions everywhere. They give a wide choice of candidates.

For Every Business want
"*Think* SEARCHLIGHT *First*"

0134

DAY & ZIMMERMANN, Inc.
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and
Reports to Bankers and Investors
Security Building, St. Louis, Mo.

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and
Mechanical Testing
80th Street and East End Ave., New York, N. Y.

THE P. EDWARD WISH SERVICE
50 Church St. DETECTIVES 131 State St.
NEW YORK *Street Railway Inspection* BOSTON

Scofield Engineering Co. Consulting Engineers
PHILADELPHIA, PA.
POWER STATIONS GAS WORKS
HYDRAULIC DEVELOPMENTS ELECTRIC RAILWAYS

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Passenger train going over an acute angle Thermit-welded crossing for double track street railway and single track steam railroad intersection.

Thermit Welded Special Work Prevents Winter Labor Turnover

The advantage of being able to construct Thermit welded special work indoors in railway shops affords a timely opportunity at this season for way departments to equip their shops with our simple and inexpensive Thermit welding outfit for welding frogs and special work. Once the shop is equipped for this class of work it is possible to keep trackmen busy in bad weather and in winter weather as well as during summer months.

In this way the track organization can be held intact and kept busy year in and year out, an advantage, we are sure, every engineer of way will appreciate. It saves the laying off of experienced men in dull seasons with the consequent necessity of breaking in new men when maintenance and construction work is resumed in the spring.

Send for Pamphlet 3932.

Metal & Thermit Corporation

120 Broadway New York

Pittsburgh Chicago Boston San Francisco Toronto

Longitudinal Section of a Butt-Treated Pole Showing ½ Inch Penetration.

Guaranteed ½ Inch Uniform Penetration

THE P & H Guaranteed Penetration Process is revolutionary in the pole industry. It gives to pole users the first perfected Butt-Treating process that guarantees a uniform penetration of the preservative throughout the ground line area of the pole.

The specifications for the P & H Guaranteed Penetration Process are result specifications. ***The first of its kind in the history of the pole industry guaranteeing the result that pole buyers have wanted for years.***

On the end of every pole Butt-Treated by the P & H Guaranteed Penetration Process is countersunk the metal disc, showing that ½ inch uniform penetration of the preservative is guaranteed. In addition, with every shipment of poles the pole-buyer receives the written guarantee.

Behind these stands the reputation of Page & Hill Co., with their 19 years of success in the pole industry, and the largest and most completely equipped Butt-Treating plant in the world.

No other Butt-Treating process guarantees these results. Don't be satisfied with any but the P & H Guaranteed Penetration Process.

Write for Full Particulars.

PAGE & HILL CO.
Minneapolis, Minn.

BRANCH OFFICES:

Times Bldg., NEW YORK, N. Y.
717 Bryant Bldg., KANSAS CITY, MO.
19 So. LaSalle, CHICAGO, ILL.
1111 Carter Bldg., HOUSTON, TEXAS
311 Sumpter Bldg., DALLAS, TEXAS
1416 Starks Bldg., LOUISVILLE, KY.

Originators of the P & H Guaranteed Penetration Process. Producers, manufacturers, and foremost in the Butt-Treatment of Cedar Poles.

Metal disc countersunk on the butt-end of every pole Butt-Treated by the P & H Guaranteed Penetration Process is your assurance of one-half inch penetration.

Butt-Treated
BY
PAGE & HILL Co.
1920
GUARANTEED
One-Half Inch
PENETRATION

Our extensive, modern plant, illustrated on this page, is equipped to fabricate track work of all constructions, Solid Manganese Steel, Manganese Steel Insert, Plain Bolted and Manganese Steel "T" Rail, etc., which coupled with our long experience, places us in a position to supply your needs efficiently.

WHARTON SPECIAL

SWITCHES—MATES—

of Solid Manganese Steel

"GIANT HEEL" Switch

Converter and Electric
Steel Castings

WM. WHARTON JR. & CO., INC.

EASTON, PENNA.

"Originators of Manganese Steel Track Work"

SALES OFFICES:

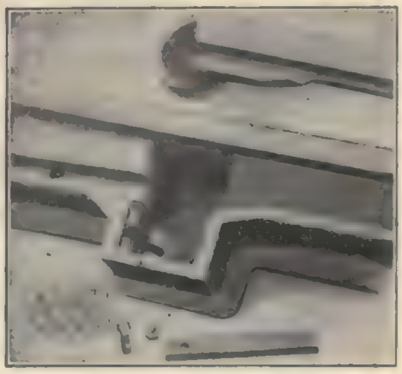
Denver, Colo.
New York City
Boston, Mass.
Chicago, Ill.
Philadelphia, Pa.
Pittsburgh, Pa.
San Francisco, Cal.
Scranton, Pa.

The illustration above gives a comprehensive view of our large Layout Yard, where Special Track Work is assembled and carefully fitted together, to avoid any possibility of trouble during installation. No piece of work leaves our plant without such careful fitting.

TRACK WORK

FROGS–CROSSINGS

and Manganese Steel Insert



H. C. B. Switch

Hammer and Press Forgings
Seamless Steel Gas Cylinders

***Subsidiary of* Taylor-Wharton Iron & Steel Co.**

High Bridge, N. J.

Other Plants:

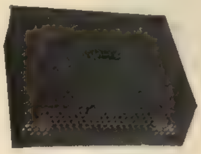
TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
PHILADELPHIA ROLL & MACHINE CO., Philadelphia
TIOGA STEEL & IRON CO., Philadelphia

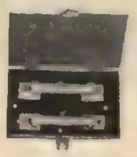
Buzzers

Signal Light

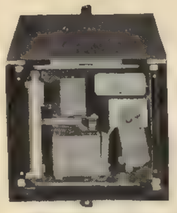
Single Stroke Bells

Safety Switch


Resistance Boxes


Fuse Boxes

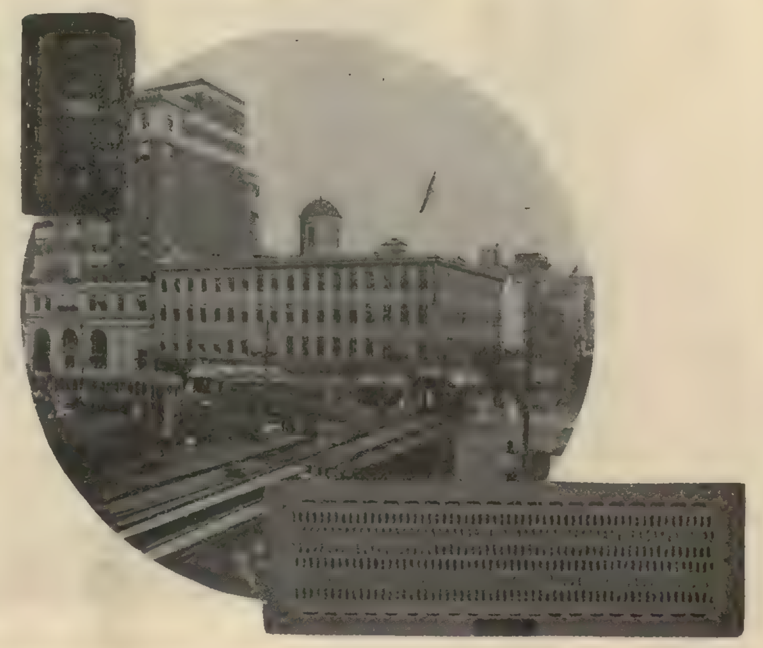
Thermostat


Magnetic Switch

Pneumatic Door Engine

Cross Seat Type Elec. Heater

Here is the Consolidated line of high grade special equipment



Consolidated Electric Heaters

and Wintry Weather are not a bad combination, because with Consolidated heaters, you make it a pleasure for the public to ride, by having warm cars at all times.

In addition, they are light in weight, strong in construction, efficient in operation, and all parts are quickly and easily renewable.

Moreover, Consolidated heaters and accessories have stood the test of time.

They positively heat a car and with Consolidated Thermostat Control a constant temperature is obtained, thus keeping the current consumed down to a minimum.

Watch your coal pile. You can do it best by specifying Consolidated heaters and Thermostats on all your cars. They permit free, rapid circulation on all sides and keep the car temperature right up to exactly the right point.

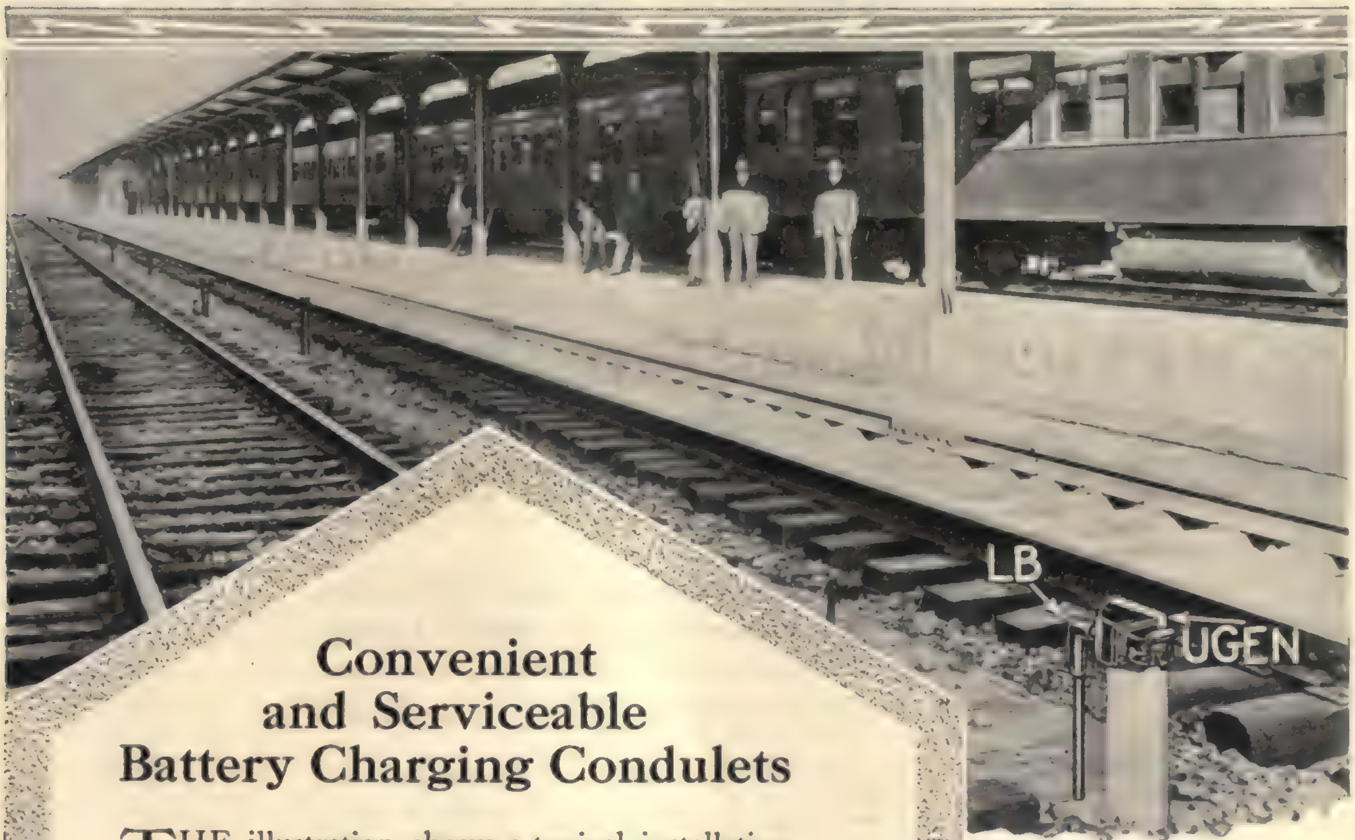
Maintenance a Minimum

CONSOLIDATED CAR-HEATING COMPANY

Albany, New York

New York City Chicago Coaticook, Quebec

CONDULETS



Convenient and Serviceable Battery Charging Condulets

THE illustration shows a typical installation of a UGEN Condulet for battery charging at a railway terminal. The design of the UGEN Condulet permits it being mounted on a tie or upright support as conditions require.

These Condulets are furnished with two types of receptacles—rectangular or round. The round receptacles take plugs of the standard M. C. B. dimensions.

Let us mail catalog.

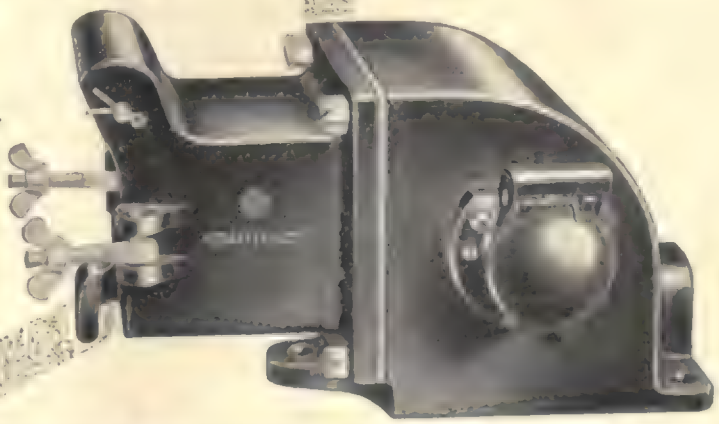
CROUSE-HINDS COMPANY
SYRACUSE, N. Y.
BOSTON NEW YORK CHICAGO

Condulets Panelboards
Knife Switches Floodlights
Guy Anchors

1594

UGEN CONDULETS

Outlets for vacuum cleaner connection can be obtained by the attachment QD-10 shown on side of Condulet Body.



Condulet the Job

CROUSE-HINDS

Collier Service

How the Experience of Collier Service Maintains Faith in Car Card Advertising

Your experience in transportation has taught you how to adjust your service—which is your selling appeal—to the habits of your patrons. Otherwise your investors would have nothing to show for their investment.

Experience is just as vital a factor in advertising, not simply in advertising as a whole but in such a highly specialized field as car cards.

For instance, only the nation-wide, generation-long experience of Collier Service assures the car card advertiser of the highest percentage of messages that will be *read*, APPROVED and FOLLOWED because Collier Service has developed precisely the right kind of appeal that can be put into the few words and the simple picture most practicable on a standard size car card.

It follows that if the user of Collier Service had failed to receive satisfactory results, car card advertising would never have become a *stable* source of electric railway income.

Barron G. Collier
INCORPORATED

Candler Building, New York

Why technical men hold themselves back

"A great many engineers are unconsciously holding themselves in check because they fail to grasp business principles."

—John A. Harrington, of the Executive Committee, American Association of Engineers.

WHAT Mr. Harrington and other engineering authorities are saying about the importance of business training for technical men, the Alexander Hamilton Institute began emphasizing years ago.

The Institute was founded by a group or business leaders who recognized that modern business was training specialists but was not developing executives in proportion to the constantly increasing demand.

From the first it has been an axiom with the officers of the Institute that "a technical man is the ideal Institute man"; and that axiom has proved itself in the fact that out of the army of men whom the Institute has enrolled one in ten is a man of technical training or interest.

The men of whom presidents and general managers are made

Just what is it that the Institute has done for these thousands of engineers and technical men. Let us illustrate very specifically:

You are an engineer, a chemist, a draughtsman, a master-mechanic—in a word, a man who has reached his present position in business thru specialized training of one sort or another.

You can see your way clearly to a place at the head of your department; but beyond that what does business have in store for you?

Do you know the fundamentals of accounting? Of merchandising and advertising; of factory and office organization; of business law and corporation finance?

These fundamentals a man *must* know if he is to direct an organization, or engage in business for himself.

And it is precisely these essentials that the Institute—thru its Modern Business Course and Service—undertakes to give—not in years, but in the spare moments of a few months.

No man could run thru the letters

contained in the Institute's files without feeling that here is an opportunity which every man of technical training ought to investigate, at least.

Here is a sentence from the chief engineer of a great port city, for example: *"I know of nothing that could tend more towards the advancement of an engineer on any line of work than a thoro study of Modern Business."*

And another from a resident engineer, of a giant engineering company: *"The engineering profession is broadening, and men trained as engineers are more and more being used in business where their technical education gives them an excellent groundwork."*

"Your training enabled me to effect economies in my work which I had not dreamed of before," says a prominent electrical engineer. And other men, in every phase of technical work, are on record with equal positiveness and enthusiasm.

To save the wasted years

The Alexander Hamilton Institute has only one Course and one product—trained executives. It does not claim to be able to transform failures into successes; its interest is with the man who would ultimately score a fair measure of success even without its help.

To such a man it says: "There is a shorter road to one of the important positions in business than merely routine experience; thousands of men have proved that truth thru their own experience and success.

"You know better than anyone else what a year of your life is worth. But if the Alexander Hamilton Institute can save five years for you that would otherwise be lost in a routine job, or three years or even one, surely that promise is worth your investigation."

Investigation is easy; you have merely to send for

"Forging Ahead in Business"

Forging Ahead in Business is a book of 116 pages. Into it have gone the results of years' experience in helping men to success. It answers every question you can raise about the Alexander Hamilton Institute; it contains letters from men whose positions in business were very similar to yours. It is a book that should be in every man's library, and there is a copy for every man of serious purpose. It is sent without obligation; send for your copy today.

Alexander Hamilton Institute
30 Astor Place New York City

Send me "Forging Ahead in Business" which I may keep without obligation.

Name ______________________
Print Here

Business Address ______________________

____

Business Position ______________________

Canadian address, C. P. R. Bldg., Toronto: Australian address, 89 Castlereagh St., Sydney

Copyright, 1920, Alexander Hamilton Institute

H-B Life Guards

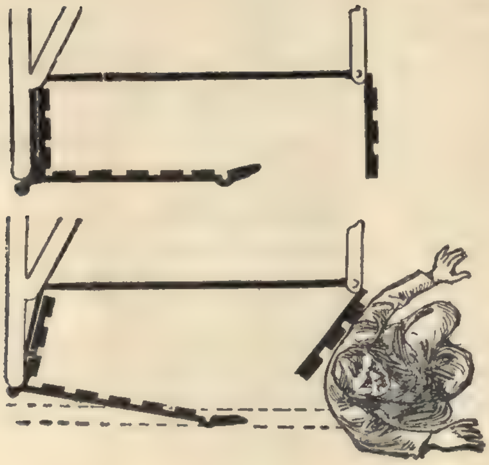
are just what you want for close schedule service and crowded city streets

It is recognized as the one device that never fails to operate and to protect. It is quick as a flash. The cost is insignificant.

Years of Constant Service

On heavy cars in every nook and corner of the United States, Canada and Cuba is largely responsible for its being specified on practically every large order for safeties.

H-B Life Guards the last word in making the safety car safer.



"Barrier of Safety" between the fallen pedestrian and the car wheels

The Consolidated Car Fender Co.
Providence, R. I.

General Sales Agent
Wendell & MacDuffie Co.
61 Broadway, N. Y.

Iron-Bound Necessity of Reducing Line Maintenance Costs Is the Sole Reason for Flood City Trolley Line Specialties

FLOOD CITY

specialties will cut your costs, give greater reliability and insure longer life to your line and equipment. Our manufacturing facilities are such that we produce equipment of superior quality. Just now we are making deliveries from stock. What are your needs? One trial and you'll use no other.

Write for details.

Flood City Mfg. Co.
Johnstown, Pa.

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

S BRAND *"The 'Standard' Brand on your material is an assurance of eventual economy."* S BRAND

STANDARD STEEL WORKS CO.

GENERAL OFFICES:

500 NORTH BROAD ST., PHILADELPHIA, PA.

CHICAGO
ST. LOUIS
HAVANA, CUBA
ST. PAUL

RICHMOND
SAN FRANCISCO
NEW YORK
HOUSTON

MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

NATIONAL

PRODUCTS

Are

"All You Require When You Wire"

ANY railway can secure from National Wiring Products material for the *entire* wiring job for cars, power house, substations, etc. No waiting for deliveries from different suppliers; no following up of many requisitions; no writing or wiring to several organizations.

A complete set of our convenient and helpful Correspondence Folder Catalogs will be sent you upon request.

National Metal Molding Co.

General Offices: Pittsburgh, Pa.

Atlanta
Boston
Chicago
Denver
Detroit
Los Angeles
New York
Philadelphia
Portland
Salt Lake City
San Francisco
Seattle
Buenos Aires
Rio de Janeiro
Sao Paulo Brazil
Lima, Peru
Santiago, Chile
Medellin, Colombia
Havana
Manila
Mexico City
Shanghai, China

Canadian Distributors: Canadian General Electric Co., Limited.

National Products are sold by Electrical Jobbers in every section of the country.

Happy New Year

MIDVALE STEEL AND ORDNANCE COMPANY

CAMBRIA STEEL COMPANY

MIDVALE

CAMBRIA

General Sales Office: Widener Building, Philadelphia, Pa.

District Sales Offices:
Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia,
Pittsburgh, San Francisco, Salt Lake City, Seattle, St. Louis

Sole Export Representatives:
Consolidated Steel Corporation, 165 Broadway, New York
All export inquiries should be sent to this address

Series Number 45-I

—*economical lubrication is not determined by cost of oil, but by its effect upon motor maintenance cost.*

NOT how much do you pay for a pound or gallon of lubricant but how does your lubrication affect your motor maintenance cost per mile. That's the only way to accurately check lubricating costs.

Figured on the "cost per car per mile" basis, Tulc is by far the most economical lubricant on the market today. It reduces wear on axles and armatures. It eliminates hot boxes and cut axles. It does not splash upon commutators to cause shorts and burned out armatures. It does not leak to rot out fields.

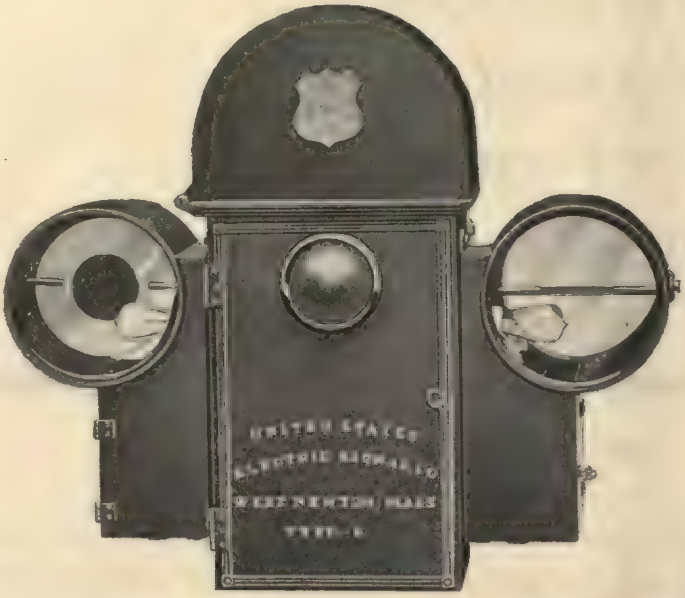
These are some of the reasons why some of the leading Electric Railways use Tulc. In addition a number report savings in lubricating costs *as high as* 40%.

***The* Universal Lubricating Co.**

Offices: Schofield Bldg.
Works: Sweeney Ave.
CLEVELAND, OHIO

TULC
A
LUBRICANT

—scientifically and accurately compounded to reduce lubricating costs



Signals of Safety for Safety Car Routes

With the high speed schedules and close headway of the safety car, it is imperative that you use Signals.

The signal best suited to your requirements is the one that is big, reliable and clearly discernible day and night. One so installed that the first car to reach the cut in contactor will have the right of way.

Those signals are U. S. Electric Signals, that prevent instead of cure.

United States Electric Signal Company, West Newton, Massachusetts

Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Service Supply Company, Salford, Eng.

"Had 5 answers to the first issue"

So the Selma Electric Railway Co., Selma, Ala., wrote us in regard to their recent ad. in the

SEARCHLIGHT SECTION
of
Electric Railway Journal

"SEARCHLIGHT" ads are Opportunity ads. They are watched carefully each week by the whole electric railway field.

"SEARCHLIGHT" ads cost little and invariably bring prompt returns.

For Every Business Want
"Think SEARCHLIGHT First"

0133

Bates One-Piece Steel Poles Have Great Strength

Notice that the Bates Poles shown above are not guyed although they are taking the side stress of a sharp curve on a double track and carrying four heavy feeders.

The scientific design of the Bates Pole utilizes the strength of the steel where the strength is needed, thus reducing the weight and the cost.

Bates Poles are Permanent, Reliable, Strong and Economical—Get our new 1921 Treatise before you specify your new construction.

Bates Expanded Steel Truss Co. 208 South La Salle Street
CHICAGO, ILLINOIS

Railway Engineers Who Have Studied the Qualities of Lumber
are a unit in agreement on the fact that

CYPRESS—*"the Wood Eternal"*

S C M A
TRADE MARK REG. U.S. PAT. OFFICE

(provided that you get Genuine "Tide-water" Cypress, guaranteed by the Association's Trade-mark)

is the best wood for all forms of use where high resistance to decay is an essential. This fact is pretty clearly indicated by the recommendations of the Railway Signal Engineers Association for the use of Cypress in

TRUNKING and CAPPING

It is equally valuable for *right-of-way fencing, snow fences,* and all similar forms of use where the material is constantly exposed to the action of the weather.

Make such forms of construction supremely durable by using

CYPRESS "The Wood Eternal"

Full data regarding Cypress for all electric railway uses will be furnished on request.

Southern Cypress Manufacturers' Association

1265 Perdido Building, New Orleans, La.
1265 Heard National Bank Building, Jacksonville, Fla.

Motor Generator Sets for Railways

**Built on a Foundation of wide Experience
in ANY capacity**

Many in daily operation are giving reliable Service

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

1000 Kw. Set

Nuttall Helical Gears

A PROVEN SUCCESS

Profit or Loss depend on your interpretation of Wear and Life.

All Westinghouse Electric & Mfg. Co.
District Offices are
Sales Representatives in the United States
for
Nuttall Electric Railway and
Mine Haulage Products.

Here is the reason:

A gear can be guaranteed to WEAR a certain length of time, but a guarantee of wear gives no insurance against breakage.

Nuttall BP treated gears are guaranteed for four times the life of untreated cast steel gears in identical service. This Nuttall guarantee of LIFE covers both WEAR and BREAKAGE.

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

Utah

275 Elec Ry cars in State.
of which
202 are operated by Companies
which regularly use
"Tool Steel" Gears & pinions
$\frac{202}{275} = 74\%$
Watch for your state!

Can you look *INSIDE* your motors?

When something goes wrong how often have you wished you could turn your motors and generators inside out, and see just what is the matter with them.

Yet all you can do is to grope about blindly 'till chance enables you to find the trouble. And then—"What should I do first?" has to be answered.

Do away with all this worrisome guesswork. At last you have access to hundreds of ready answers to your questions, hundreds of quickly applied solutions to your repair problems—tried facts that tell you what to do FIRST in locating and correcting equipment troubles. Not only what to do but HOW to do it and what to do it WITH.

Gandy and Schacht

MOTOR TROUBLES

270 pages, 5½ x 8, illustrated, $2.50 net.

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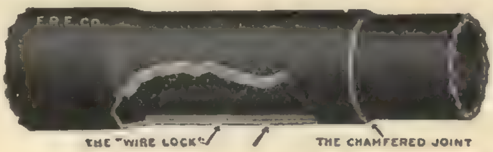

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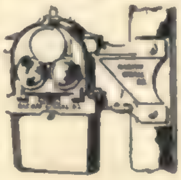

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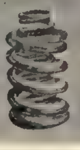

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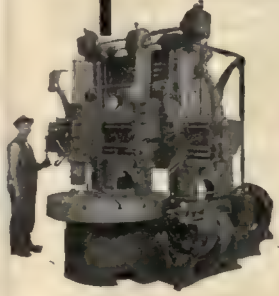

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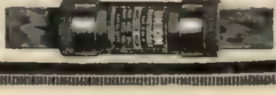

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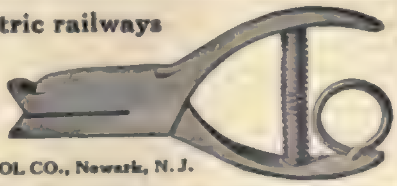

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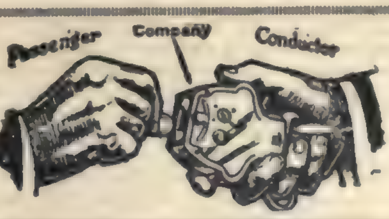

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The Slaughter of the Innocents

WHEN JESUS CHRIST came upon the earth, nearly two thousand years ago, to save all mankind, his mere coming seemed to interfere with the material interests of a few people of that period, notably King Herod, who promptly decided to dispose of this "interloper," and sent forth his soldiers with orders to slay all the children of two years old and under. Thus was consummated the most atrocious crime against innocent childhood ever committed up to that time. It has come down to us through all the ages in song and story, and master painters have pictured it on marvelous canvases.

To-day passing in review, as we look out through the windows of our comfortable homes in this great and happy land, are three and a half millions of helpless children, the innocent victims of the greatest war that has ever afflicted humanity. It matters not, as we gaze in the direction of these children, that our eyes must stretch across three thousand miles of ocean, we still can see them and we still can hear them, if we wish to do so; and we can not help hearing the tragic appeal in their voices and seeing their tiny arms stretched out to us, and their searching eyes looking into our souls, as they say, "Help us, or we perish." And if we fail to listen to this great call of three and a half millions of God's helpless children; if we close our eyes and ears to this great demand of duty, we will be just as guilty of the "slaughter of the innocents" as was Herod, nearly two thousand years ago.

In these lands, swept by death and filled with tragedies too deep for tears, a sum of human suffering is being written greater perhaps than for all ages gone by. The mind grows numb and the heart sick from a constant recital of tales of such tragedy as it is difficult to believe the twentieth century could hold.

And so, when the call for help came from Mr. Hoover telling that America must not allow hunger and cold to return to this mass of 3,500,000 helpless children the soul of America was stirred and the hot blood surged up in our hearts. It is our imperative duty to use all the power God has given us to aid this noble-hearted American in continuing the work of saving human lives to which he has devoted unsparingly, and at great personal sacrifice, his tremendous energy and administrative genius during the past six years, in which time he and his American colleagues have administered two billions of dollars of relief funds from all parts of the world with a total overhead expense of only three-eighths of one per cent., without any remuneration to the American directors. Now he asks us all to help save the children who are in imminent danger of starvation this coming winter.

There they are, in the midst of wrecked homes, and farms, and factories; in cities crowded with masses of refugees without sustaining food for children, through the destruction of live stock; seeds for planting, raw materials, tools, and machinery gone; great areas with everything burned, or looted, or smashed; vast unemployment for workers; no means of subsistence; a land of economic ruin, of mutilated life, and lingering death; and in the midst of it all —the little children.

In long lines they are waiting at the American food-kitchens. Will the food be there for them? Will they be turned away? There are no happy, healthy faces in those long lines—not one. You have seen rags and barefooted children, but never so many little boys and girls literally drest in tatters. They are facing a winter of devastating cold, and for those bare little feet and legs and arms there is nothing at home to put on.

Hollow faces and shrunken bodies are so common that their real condition does not become evident until we inquire more closely, and then we find that most of them are from one to five years back in their growth. Children of eight years old have not reached the normal size of two and a half. They are just learning to stand alone. Others almost as old can not yet stand on their feet. Their arms, and legs, and spines, and chests are twisted and warped. The flesh and skin are shriveled on their bones. It is surprising that life can still exist there. If they can have food they will gradually regain their health and strength, but with most of them it is a question of now or never. Starvation and tuberculosis will not wait.

In Poland alone a million five hundred thousand such children must be cared for. In Latvia and Esthonia the people are living mostly on a diet made from potato-flour, oat-flour, and sawdust. In Czecho-Slovakia, in Hungary, in Austria, and in other countries of central and southeastern Europe, two millions more are in dire need of food; and who stops to ask regarding creed, or race, or nationality when a little child is starving? Children are just children the world over, and the great American heart is big enough to care for them all.

But the appeal now is not for all. The three and a half millions of children in immediate danger of starvation, if this organization fails, who *must* have food at once, are only a fraction of the total number. The hungry children of those destitute countries have been examined by competent physicians, and only those whose wasted little bodies are reduced to the minimum weight, and whose endurance of hunger has reached the end which merges into actual starvation, are admitted to the American kitchens and given *one meal a day*. It is hard to turn away thousands of hungry boys and girls—to hear them ask, pleadingly, "Do I weigh too much?" "Am I not thin enough?" "Can't I come any more?" But this restricting of food to the extreme cases is compulsory, because there isn't enough for all.

And these neediest ones can not reach the kitchens through the cold winds and the snow barefooted and in the pitiful rags which form only a partial covering for their bodies. They must have clothes. Each outfit consists of one pair of warm woolen stockings, one pair of boots, and a little overcoat. This one meal a day, and these boots, stockings, and little coats can be supplied *only if we give them*. If we do not, the slaughter of the innocents by cold and starvation will be appalling.

Among those who will read this page there is not one—there can not be a single one—whose heart will not respond gladly and eagerly to the challenge of this great need. We are asking *you* to cooperate with Mr. Hoover in raising twenty-three million dollars to feed and clothe these children and save them from death this winter. It can be done. It shall be done! This publication knows its readers and the deep earnestness, the quick sympathy, the great-hearted generosity they always show when any real human need calls to them. You have never been called upon in vain. We are counting on you now with a great confidence. We know, also, how truly you represent the American spirit, which beats in the hearts of over a hundred million people in this big land of plenty, a spirit which leaps ready at every such call, and is never weary in well-doing. We are not a hermit nation, isolated from the world, when suffering and want cry out to us from anywhere under the sun. A great, a beautiful, and heart-sustaining hope supports these stricken people—*America will come to their relief*. For in the far places of the earth, where famine stalks, one name and one alone is synonymous with rescue and hope—and that name is America.

The small individual unit of ten dollars will provide the coat and boots and stockings and one meal a day for one child this winter. We urge our readers—we urge *every one* whose eyes are on these words—to give quickly as many of these units as possible, **to buy for themselves that precious and priceless thing, the life of a little child**—as many of them as they can, and every one will be a shining star in an eternal crown. It was the Divine Lover of little children, who came to earth as a little child, and who reigns now as the King of Glory, who said, "Inasmuch as ye have done it unto one of the least of these, ye have done it unto me." He does not forget, nor fail to reward.

Mr. Hoover, Chairman of the European Relief Council which has been organized to spread this great need before the American people, is asking twenty-three millions to save the lives of these little innocent children who are facing death. This European Relief Council includes among its workers the following organizations—American Friends' Service Committee (Quakers), American Relief Administration, Jewish Joint Distribution Committee, American Red Cross, Knights of Columbus, Federal Council of Churches of Christ in America, Y. M. C. A. and the Y. W. C. A. These organizations, led by Mr. Hoover, are banded together in this great cause for humanity to redeem the little lives and save the terrible toll of tiny graves by the hundred thousand.

Let us all see again what the Father's heart is like in this great rich land of America. Let us spring to the rescue, as true Americans always have done, and contribute to the extent of our hearts—for never was a need more urgent or help wanted more quickly.

Make your check payable to Franklin K. Lane, Treasurer, and mail it to the European Relief Council, 42 Broadway, New York City. Every dollar will go toward the purpose for which you give it without one penny deducted. Give, and give *now*.

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MASTER mechanic wanted for Middle West on a division operating 40 interurbans on 600-1,200 volts. P-787, Elec. Railway Journal, Leader-News Bldg., Chicago.

POSITIONS WANTED

FOREMAN, experienced in overhauling and maintenance of rolling stock, motors, etc.; handle men to advantage; best references. PW-816, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

YOUNG man, single; now employed, desires to make change; 14 years' experience in transportation department of large Eastern railway; capable of supervising car house or system; make own schedules for short haul or interurban service. PW-818, Elec. Ry. Journal.

WANTED

We are desirous of purchasing two second-hand double truck

Trailer Cars

closed, with low center entrance.

W802—Electric Railway Journal
935 Real Estate Trust Bldg., Phila., Pa.

Notice to Advertisers

Owing to the holidays "Searchlight" pages will close for press earlier than usual. Copy should reach us as follows:

January 1st issue:

Copy received up to 10 A.M. December 29th

FOR SALE

16 West. 56 Motors. 4 K-14 Controllers. 4 National type BB-4 Air Brake Equipments complete. 15 Double Truck Cars, 40-ft. long, mounted on Brill Trucks equipped with 4 GE-67 Motors, 2 K-6 Controllers, Air Brakes, etc., complete.

Electric Equipment Co.
Commonwealth Building, Philadelphia, Pa.

5—Rotaries—300 K.W.

600 volt. D.C., 25 cy. A.C. Trans. 15,000 volt with SWBD—1600 ea. 500 & 1000 kw. 60 cy. Rot. & MG. sets. $1650.00 per Station.

BARGAINS

Send for our used mach. list.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

COMPLETE POWER PLANT

FOR SALE

1—500 h.p. Westinghouse Compound Engine, Direct Connected to 550 volt Generator.

2—200 h.p. Harrisburg Engines, Belt Connected to Westinghouse Generators.

1—B & W Boiler, 2 Keeler Boilers, Water Heaters, Pumps, Piping, Switchboards and etc.

All in first class operating condition. Immediate delivery. Make us an offer.

The Lewistown & Reedsville Electric Railway Co., Lewistown, Pa.

FOR SALE

1—25 ton, electric

Traveling Crane

or hoist symbol made by Niles-Bement-Pond Co.; center to center of runway rails, 78 ft. 4 in.; approximate vertical travel of hook, 24 ft.

United Electric Light Co.
Springfield, Mass.

FOR SALE

4—G. E. 1000 Gears.
16—G. E. 1000 Pinions.
4—G. E. 52 Gears.
10—G. E. 52 Pinions.
2—Westinghouse 49 Gears.
6—Westinghouse 49 Pinions.
12—Westinghouse 3 Gears.
6—Westinghouse 3 Pinions.
6—U. S. trolley harps for 6-in. wheels.
2—G. E. 800 Commutators.
1—Westinghouse 49 Commutator.
Segments and resistance panels for type "K" controllers.

Advise Purchasing Agent

TRENTON & MERCER COUNTY TRACTION CORP.
Trenton, N. J.

Immediate Shipment

GIRDER RAIL

300 tons 7 in. girder rail, located Amityville, New York, also 1000 tons 70 lb. rail, 2000 tons 90 lb. rail. Write or wire for prices quoted.

M. K. FRANK, Pittsburgh, Pa.

New—Used—Rebuilt

MACHINERY AND SUPPLIES

for construction and industrial work.

READING ENGINEERING CO., INC.
154 Nassau St., New York

—a manufacturer

in Newark, N. J.

—saved $200

buying from an Indiana dealer in

—second-hand machinery

through his advertising in the

—searchlight section

It pays
to read the Searchlight.
It pays
to advertise in the Searchlight.

0058

Machinery in Stock for *Immediate Shipment*

ROTARY CONVERTERS

1—300 kw., Westg., 3-phase, 60-cycle, 370-v., A.C., 575-v., D.C., 600 r.p.m.

2—200 kw., G.E., 3-phase, 25-cycle, 85-v., A.C., 125-v., D.C., 8 pole, 375 r.p.m.

FREQUENCY CHANGER SETS

1—600 kva., Allis-Chalmers Frequency Changer Set, 300 r.p.m., 3-phase, 60-cycle, 2300-v. one end, 3-phase, 6600-v., 25-cycle on other end.

1—400 kw., G. E., 3-phase, 25-cycle, 6000-v. one side—2400-v., 2-phase, 60-cycle other side—375 r.p.m.

ARCHER & BALDWIN, INC.
114-118 Liberty Street, New York City
Telephone 4337-4338 Rector

Users G. E. 67-70-80 Motors

A Special Lot of Repair Parts for Sale—Immediate Shipment

334 ARMATURES
Many newly rewound with new commutators.

182 ARMATURE CORES
With or without commutators.

800 ARMATURE BEARINGS
Many new ones.

300 PINIONS
Many sizes.

86 MOTOR FRAMES
Complete with Pole Pieces.

500 BRUSH HOLDERS

37 MOTOR FRAME "HALVES"

1200 FIELD COILS "IMPREGNATED"
300 are new.

250 AXLE BEARINGS
All sizes.

50 GEAR CASES

100 GEARS, Many Sizes

210 G. E. 67 MOTORS COMPLETE
76 G. E. 80 MOTORS COMPLETE

Will sell at very low prices or exchange for other equipment

We have in stock virtually every type of Railway Motor in use, together with extra repair parts for same—also Controllers, Air Equipments, et cetera.

TRANSIT EQUIPMENT COMPANY, 501 Fifth Ave., New York

BARGAINS!

Garton Daniels 350-750 V. Lightning Arresters.
No. 9 Hemingray Pony Glass Insulators.
Bronze Trolley Frogs.
Flexible Pole Brackets.
Westinghouse Type A Lightning Arrester.
Watt Hour Meters.
110 V., D. C. Bonding Car.
And many other items.

ZELNICKER IN ST. LOUIS

There are many other bargains in our Bulletin No. 285. Send for a copy.

700 tons new 9 in.

GIRDER RAIL

Penna Steel Co. section 228, 112 lb. to the yard. Price—$45 per gross ton, f.o.b. cars Brooklyn, N. Y. Subject to R. W. Hunt & Company's inspection.
Prompt shipment.

H. M. FOSTER CO.
Continental Building, Baltimore, Md.

Buyers
Everywhere
know
"Searchlight"

Try an ad for what you wish to sell.

0232

FOR SALE

Two 300-H.P. 500 Volt MILL MOTORS

Two Westinghouse 300-h.p. 345 to 500 r.p.m., 500 volt, D.C., compound wound motors, with one spare armature, including two Cutler Hammer, 300-h.p., 500 volt, D.C. Starters.

Condition good. Ready for inspection. Reason for selling, voltage changed. Write

H. LLEWELLYN, General Purchasing Agent
PITTSBURGH STEEL PRODUCTS CO.
Union Arcade Bldg., Pittsburgh, Pa.

NEW REBUILT **ELECTRIC MOTORS** REWINDING REPAIRING

NEW A.C. MOTORS ¼ to 15 H.P.—LARGE STOCK USED MOTORS
EXCELLANT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.
EST. 1895 4732-4-6 ST. CLAIR AVE., CLEVELAND, O. *INC. 19*

NEW

80 lb. RAIL & ACCESSORIES

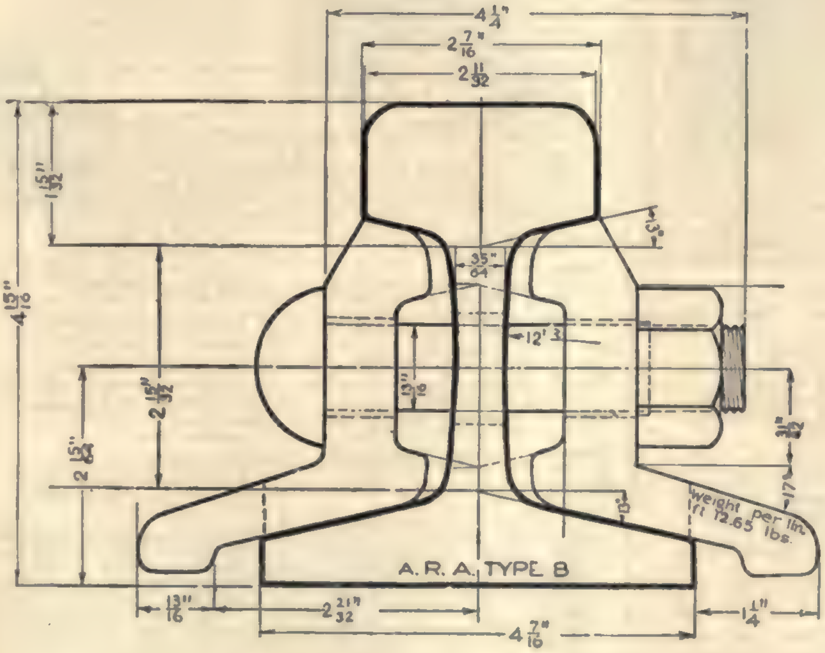
ANGLE BARS, SPIKES, BOLTS AND NUTS COMPLETE

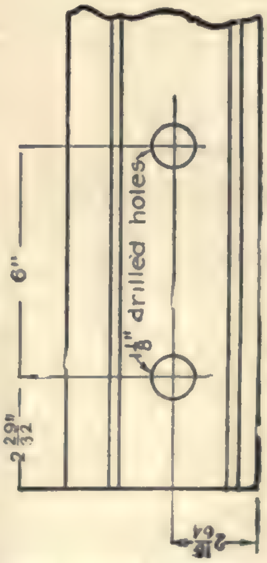
For Sale

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, N. J.





Note actual dimensions of rail stated hereon.

HYMAN-MICHAELS COMPANY

NEW AND RELAYING RAILS

Peoples Gas Building, Chicago, Ill.

New York Office
1324-1326 Woolworth Building

Pittsburgh Office
1312 First National Bank Building

We buy electric and steam railways that are to be dismantled

St. Louis Office
2115 Railway Exchange Building

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Ammeters
Weston Electrical Instrument Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Ash Storage Tank, Cast Iron
Green Eng. Co

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Cambria Steel Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
National Carbon Co., Inc.

Batteries, Storage
Electric Storage Battery Co.
National Carbon Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes, Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Ackley Brake & Supply Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

Brick, Fire
Green Eng. Co.

Bridges and Buildings
American Bridge Co.

Brooms, Track, Steel or Rattan
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
United States Graphite Co.

Brushes, Motor and Generator
National Carbon Co., Inc.

Brushes, Starting and Lighting
National Carbon Co., Inc.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Bunkers, Coal
American Bridge Co.

Bushings
National Metal Molding Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables (See Wires and Cables)

Carbon Brushes (See Brushes, Carbon)

Carbons, Photographic
National Carbon Co., Inc.

Carbons, Projector
National Carbon Co., Inc.

Carbons, Welding
National Carbon Co., Inc.

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Ackley Brake & Supply Corp.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Caustic Soda Cells
National Carbon Co., Inc.

Ceiling, Car (See Headlining)

Circuit Breakers
Automatic Reclosing Circuit Breaker Co.
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Condensors, Papers
Irvington Varnish & Insulator Co.

Conduit Fittings
Chicago Fuse Mfg. Co.

Conduits, Interior
National Metal Molding Co.

Condulets, Conduit Fittings
Crouse-Hinds Co.

Connectors, Solderless
Frankel Connector Co.
Westinghouse Elec. & Mfg Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
Portable Machinery Co

Conveyors, Coal and Ash
Green Eng. Co.
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

Conveying and Hoisting Machinery
Allis-Chalmers Mfg. Co.
American Bridge Co.
Columbia M. W. & M. I. Co.
Green Engr. Co.
Portable Machinery Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Cranes
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Creosote
Barrett Co., The

Creosoting
Barrett Co., The

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing Signals (See Signals, Crossing)

Crossings, Frog and Switch
Wharton, Jr., & Co., Wm.

Crossings, Track (See Track, Special Work)

Curtains and Curtain Fxtures
Brill Co., The J. G.
Electric Service Supplies Co
St. Louis Car Co.

Cutouts
Chicago Fuse Mfg Co.

Dealers' Machinery
Archer & Baldwin
Electric Equipment Co.
Foster Co., L. B.
Hyman Michaels Co.

Derailing Devices (See also Track Work)
Cleveland Frog & Crossing Co.
Wharton, Jr., & Co., Wm.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc

Draft Rigging (See Couplers)

Drills, Rock
Ingersoll-Rand Co.,

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Drinking Cups, Sanitary Paper
Individual Drinking Cup Co., Inc.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Inc., Walter A.

Electrical Wires and Cables
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Electrodes
National Carbon Co., Inc.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co The
Clark & Co., Mgr., Corp., E. W.
Day & Zimmermann
Engel & Hevenor
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jacobs & Co., J. L.
Jackson, Walter
Parsons, Klapp, Brinkerhoff & Douglas
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Scofield Engineering Co.
Stone & Webster
White Engineering Corp., The J. G.

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co

Fare Boxes
Brill Co., The J. G.
Cleveland Fare Box Co.
Johnson Fare Box Co.
National Railway Appliance Co.

MILWAUKEE OIL STORAGE SYSTEMS

SELF-MEASURING PUMPS
KANT-LEEK OIL TANKS
with
UNDERWRITER'S LABELS

CAR JOURNAL WASTE SATURATING OUTFITS

SEND FOR SPECIAL RAILWAY EQUIPMENT · CATALOG

MILWAUKEE TANK WORKS
MILWAUKEE, U.S.A.

-for Precision in Test Work

Weston

Portable Single-Phase Wattmeters

These instruments are striking examples of successful instrument construction. They embody many mechanical and electrical refinements which have resulted in the production of the peerless wattmeter. Being shielded, they may be used in the proximity of stray fields. Having an accuracy of ¼ of 1 per cent of full scale value under normal working conditions, they are excellent working standards as well as test Instruments. They have double current and potential ranges that may be quickly changed. The power consumption is very small.

Their phase angles being exceedingly small, these Instruments may be used on low power factors without appreciable error in the readings.

The Current coils have 100 per cent overload capacity. The overload capacity of the Potential circuit is ample and varies with the range.

Special Instruments are available for use on very low power factors.

Write for Bulletin 2002.

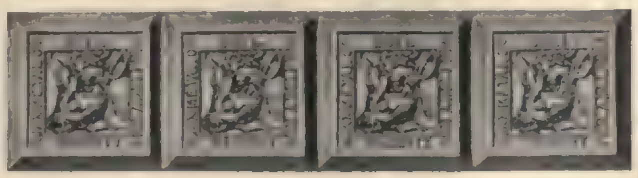
Weston Electrical Instrument Co.
21 Weston Ave.
Newark, N. J.
Branches in All Principal Cities

Model 310
Portable Single-Phase Wattmeter

AJAX BULL BABBITT

The purest virgin metals in correct formula alloyed by the highly perfected Ajax *process* enable us to guarantee that for general purposes Ajax Bull Babbitt will wear longer and run cooler than Genuine, other tin base or lead base babbitts.

THE AJAX METAL COMPANY
Established 1880
Main Office & Works: Philadelphia, Pa.
Southern Plant: Birmingham, Ala.



They are uniform in quality

They talk for themselves

W. J. Jeandron
227 Fulton Street
New York City

Pittsburgh Office:
636 Wabash Building

Canadian Distributors:
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto

The "Hycap-Exide" Battery
for
STORAGE BATTERY
STREET CARS

THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

WHAT AND WHERE TO BUY

Feed Water Heating
- Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
- American Steel & Wire Co.

Fenders and Wheel Guards
- Brill Co., The J. G.
- Cleveland Fare Box Co.
- Consolidated Car Fender Co.
- Electric Service Supplies Co.

Fibre and Fibre Tubing
- Continental Fibre Co.
- Westinghouse Elec. & Mfg. Co.

Field Coils (See Coils)

Filters, Water
- Scaife & Sons Co., Wm. B.

Flashlights
- National Carbon Co., Inc.

Floodlights
- Crouse-Hinds Co.
- Electric Service Supplies Co.

Flooring Composition
- American Mason Safety Tread Co.

Forgings
- Columbia M. W. & M. I. Co.
- Eureka Co.
- Standard Steel Works Co.
- Williams & Co., J. H.

Frogs, Track (See Track Work)

Funnel Castings
- Wharton, Jr., & Co., Inc., Wm.

Fuses and Fuse Boxes
- Chicago Fuse Mfg. Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.
- Williams & Co., J. H.

Fuses, Refillable
- Chicago Fuse Mfg. Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.

Gages, Oil and Water
- Ohio Brass Co.

Gaskets
- Power Specialty Co.
- Westinghouse Traction Brake Co.

Gas-Electric Cars
- General Electric Co.

Gas Producers
- Westinghouse Elec. & Mfg. Co.

Gates, Car
- Brill Co., The J. G.

Gear Blanks
- Standard Steel Works Co.

Gear Cases
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Westinghouse Elec. & Mfg Co.

Gears and Pinions
- Ackley Brake & Supply Corp.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- General Electric Co.
- National Railway Appliance Co.
- Nuttall Co., R. D.
- Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
- General Electric Co

Generators
- Allis-Chalmers Mfg. Co.
- General Electric
- Westinghouse Elec. & Mfg. Co.

Gongs (See Bells and Gongs)

Grates, Chain
- Green Eng. Co.

Greases (See Lubricants)

Grinders and Grinding Supplies
- Metal & Thermit Corp.
- Railway Track-work Co.

Grinding Blocks and Wheels
- Railway Track-work Co.

Guards, Cattle
- American Bridge Co.

Guards, Trolley
- Electric Service Supplies Co.
- Ohio Brass Co.

Guy Anchors
- Crouse-Hinds Co.

Harps, Trolley
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- More-Jones B. & M. Co.
- Nuttall Co., R. D.
- Star Brass Works

Headlights
- Electric Service Supplies Co.
- General Electric Co.
- Ohio Brass Co.
- St. Louis Car Co.

Heaters, Car (Electric)
- Consolidated Car Heating Co.
- Gold Car Heating & Lighting Co.
- National Ry. Appliance Co.
- Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water
- Cooper Heater Co.
- Smith Heater Co. Peter

Heaters, Car (Stove)
- Electric Service Supplies Co.
- Smith Heater Co., Peter

Hoists and Lifts
- Columbia M. W. & M. I. Co.
- Ford-Chain Block Co.
- Niles-Bement-Pond Co.

Hose
- Ingersoll-Rand Co.

Hose, Bridges
- Ohio Brass Co.

Hydraulic Machinery
- Allis-Chalmers Mfg. Co.
- Niles-Bement-Pond Co.

Injectors
- Schutte & Koerting Co.

Inspection
- Electrical Testing Lab's

Institutions, Educational
- Hamilton Institute, Alex.

Instruments, Measuring, Testing and Recording
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.
- Weston Elec. Instrument Co.

Insulating Cloth, Paper and Tape
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Insulating Varnishes
- Irvington Varnish & Insulator Co.

Insulation (See also Paints)
- Anderson Mfg. Co., A. & J. M.
- Electric Ry. Equipment Co.
- Electric Service Supplies Co.
- General Electric Co.
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- Buckeye Jack Mfg. Co.
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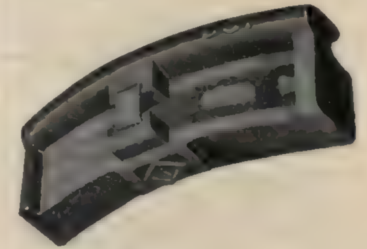

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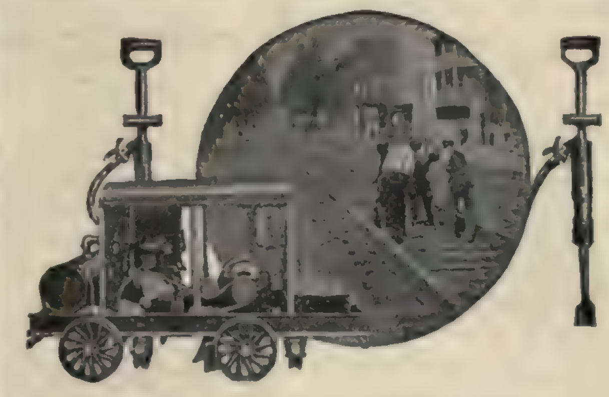

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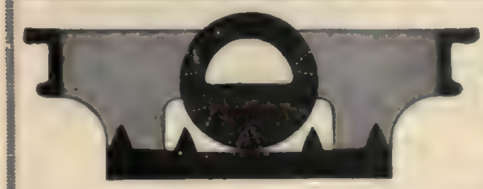

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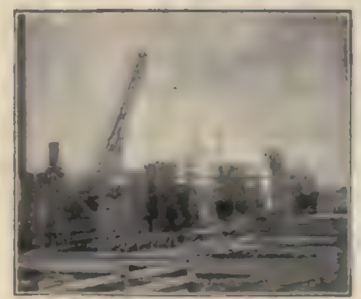
Western red cedar poles, 100 ft. long, awaiting unloading at Everett, Wash.

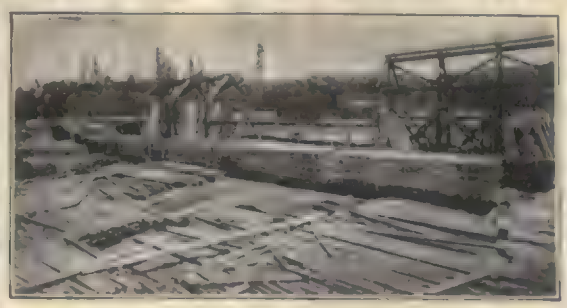
S. S. William Chatham ready to cast off at Everett with largest cargo of poles ever exported from U. S.

Poles piled for seasoning in concentration yard.

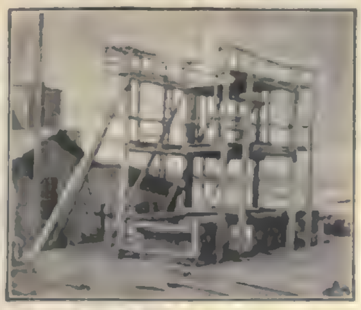
Trainload of butt-treated Western red cedar poles leaving treating plant.



Open Tank process creosoting plant of the Western Pole Preservers, Sandpoint, Idaho.



5 cars butt-treated Western red cedar poles after loading from treating tank. National Pole Co., Everett, Wash.



One of the Open Tank process pole creosoting plants of Baxter & Jordan, Wilmington, Calif.

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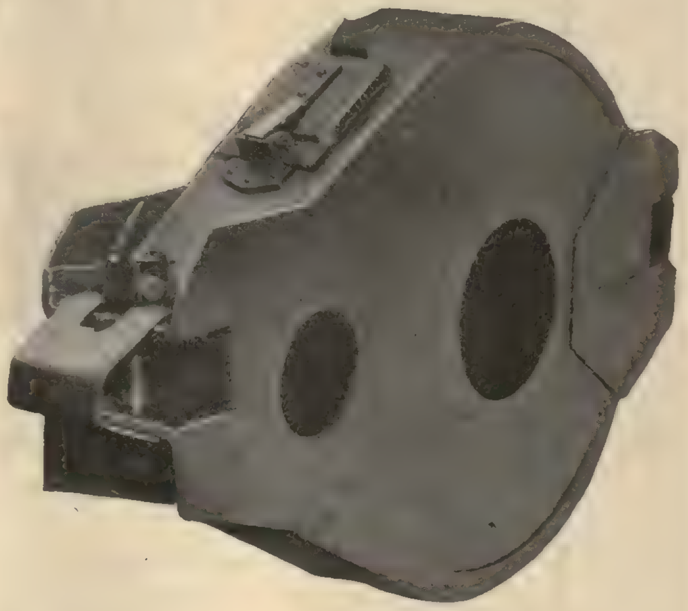

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